Coal Age

Continuous Mining and Conveying at Old Ben . p 76

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Better Drill Serves Bigger Shovel . . . . . p 98

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FEBRUARY, 1957

A McGRAW-HILL PUBLICATION—PRICE 50c

Coal in 1956: Still on the Upsurge . . . pp 54-72

How M·S·A MinePhones boosted existing haulage efficiency to handle Powhatan's increased production

With new continuous mining machines and fast-moving shuttle cars funnelling coal to a seven-mile, single-track system from 12 faces, Powhatan Mining Company officials faced the fact that production would "out run" haulage unless a plan could be devised to make existing facilities adequate for the job.

They found the answer in M.S.A. MinePhones. Twelve of these units were installed in the Company's No. 3 mine and another twelve at the No. 1 mine, near Bellaire, Ohio. The new system gives the dispatcher instant, continuous, two-way voice communication contact with locomotive motormen, the underground maintenance shop, and a "jeep" which carries men, and acts as an emergency vehicle. Now, haulage decisions are made quickly, keeping trips moving, minimizing "waits" on sidings. Repair needs are relayed "on the double," over-all safety has improved.

We will be happy to discuss your haulage system, and show you how M.S.A. MinePhones can aid efficiency, increase safety. Write for complete details.

MinePhone-equipped "jeep" carries fire extinguishers, first aid, Chemox breathing apparatus

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When you have a safety problem, M.S.A. is at your service . . . our job is to help you

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B.F.Goodrich

Stonega Coke and Coal Company's Crossbrook No. 1 Mine

B. F. Goodrich belt resists fire, will not spread flames

THREE years ago, this Virginia coal company took a major step toward increased mine safety. They ordered B. F. Goodrich conveyor belts, made with a new fire-resisting rubber.

The B. F. Goodrich fire-resisting belt will not support combustion or spread fire. While it will smolder when exposed to open flame, it stops immediately when the fire is removed. B. F. Goodrich belts have been accepted for listing as fire resistant by The Bureau of Mines (Acceptance No. 28-6).

The special rubber used in these belts also has high resistance to impact, abrasion, oil, grease, tearing, cutting, gouging, and even mildew attack. As a result, B. F. Goodrich belts made with fire-resisting rubber can be expected to equal—or surpass—the long service records made by other B. F. Goodrich Caricoal belts in underground mines.

At the mine shown in the picture, the superintendent reported that the B. F. Goodrich fire-resisting belts show little or no wear.

Let your B. F. Goodrich distributor show you how longer-lasting Caricoal conveyor belts can cut your coal-handling costs, reduce maintenance costs, and if made with fire-resisting rubber, reduce the chance of fire in your underground mines. *B. F. Goodrich Industrial Products Company, Dept. M-876, Akron 18, Ohio.*

B.F.Goodrich

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Quality Lubricants . . .

Hulburt AP Grease

now available in

. . . your answer to the rising costs of capital equipment!

Expensive mining equipment should have the long-life lubrication protection that only Hulburt can provide with its famous team of

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Hulburt AP Grease, the "strawberry grease" containing Du Pont's Estersil, has no melting point; is completely water resistant and gives many more hours of heavy-duty lube protection.

Hulburt No. 11 Lubricants—for use in hydraulic systems and gear cases—guarantee trouble-free performance because of highest film strength, plus positive oxidation, rust and anti-foam protection.

Hulburt lubricants, quality products with incomparable performance records, are the mining industry's most dependable aids in servicing equipment subject to rugged and extreme conditions. Down time is minimized and lubrication consumption cut drastically, thus adding to the productive life and economy of your machinery and other mining equipment.

Contact your Hulburt representative today to learn more of the reasons why your best lubricants are Hulburt Quality Lubricants.

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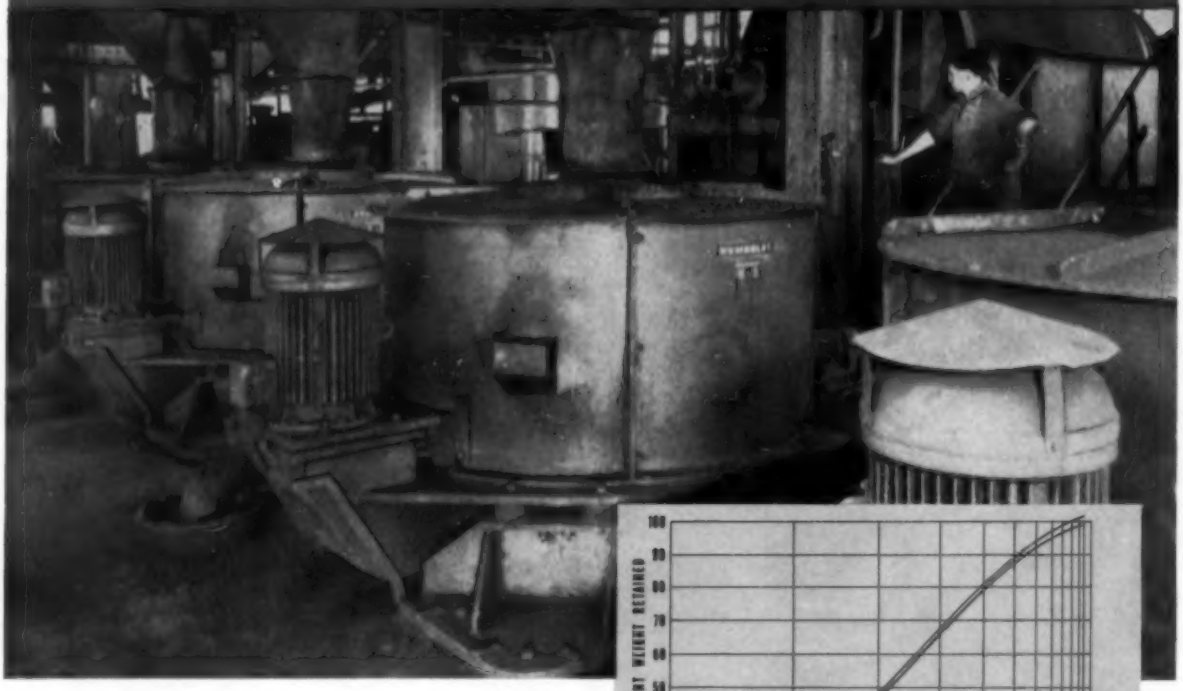
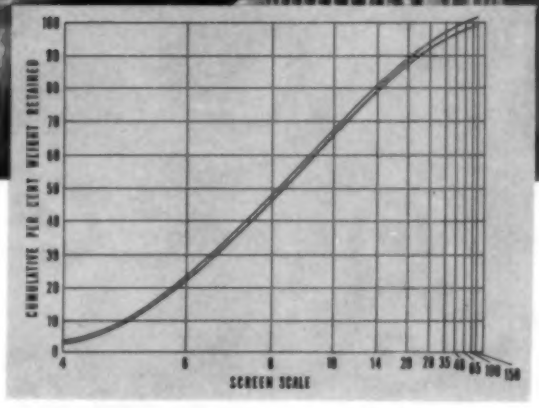
OIL AND GREASE COMPANY

Philadelphia 34, Pa.

Specialists in Quality Lubricants in the Coal Mining Industry

Bird-Humboldt Oscillating Centrifugal Dryer Proves Itself on American Coals





Here is news from the first fine coal preparation plant in this country designed specially to use Bird-Humboldt Oscillating Centrifuges.

Handling a relatively soft coal, the performance of the Bird-Humboldt is so exceptional that it justifies immediate replacement of existing screen centrifuges. Here are some of the facts and figures:

Capacity: One ton or more coal per minute. Peak loads up to 90 tons per hour.

Feed Slurry: 60 to 78% solids, size ¼ x 28 mesh.

Product Moisture: Consistently less than 5% under all feed conditions.

Effluent Losses: Less than 2% of solids input over entire screen life. Effluent solids have high ash content.

Degradation: The difference in size distribution between coal contained in feed and discharge shown in above chart. The Bird is the only screen centrifuge which can show that kind of record.

Screen Life: Well in excess of 2000 hours. 150,000 tons plus of coal can be dewatered before replacement is required.

Power Requirements: Approximately ¼ horsepower hour per ton of coal throughput.

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MACHINE COMPANY

LEADING AUTHORITY ON SOLIDS-LIQUIDS SEPARATIONS
Builders of
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Regional Offices: Evanston, Illinois • Portland, Oregon

This Month in Coal Age

FEBRUARY 1957

►The Coal Outlook

Action in '56; Progress in '57 . . . . p 54

Better Business in 1957 . . . . . p 63

Dora K. Merris, McGraw-Hill Department of Economics

Against a backdrop of rising production in 1956 and a further increase in 1957, bituminous producers moved to insure continued labor peace and supplemented further advances in cost and quality with improvements in merchandising methods. Gains were marked up in all markets but retail and railroads. Further advances are expected in 1957. Problems for 1957 and the future include money for new plants and equipment, ways of achieving a cut in mine-to-market transportation costs, and legislative action to eliminate competitive disadvantages beyond the industry's power to deal with. For anthracite, the big fact was resurgence—the first output increase in 6 yr.

Added Features—Picture highlights of the year, the 10-yr outlook for utility demand, and the top 15 bituminous producers in 1956.

►Mining, Preparation and Safety

1956 in Mining and Preparation . . p 64

Safety in 1956 . . . . . p 70

1956 Sales of Mining Equipment . . . p 72

W. H. Young, R. L. Anderson, USBM

Deep Mining—The number of continuous miners in service increased significantly. This rise was paralleled by increased emphasis on auxiliary services, including the extensible belt, wet rock-dusting, fluorescent lighting underground and improved bolting equipment.

Stripping—Bigger stripping units, up to 60 and 70 cu yd; higher-capacity drilling equipment for thicker and harder overburden; and 70-ton haulage units highlighted stripping, along with continued search for better blasting mediums.

Augering—Up again in '56, with the rise continuing into '57.

Preparation—Wet tables and heavy media played the leading roles in 1956, with additional emphasis on drying, fine-coal reclamation and treatment, and wash-water clarification.

Safety—In spite of emphasis on roof falls and other major fatality breeders, fatality rates in 1956 were about the same as in 1955. Many individual companies, however, marked up big gains.

►Freezeproofing

Cold-Weather Treatment for Coal . . p 75

Laning Dress, Preparation Director, Truax-Traer Coal Co.

How a light 80-sec oil has been used for freezeproofing at the Pyramid preparation plant in Illinois. On coal, the application ranges from 6 qt per ton for ¼x0 centrifuged carbon down to 2 qt for 1¼- or ⅞-in crushed coal from 4x2 or 2x1¼. For a 1¼x28M mixture, use is 3.4 qt per ton at a cost of 0.084c. In loading coal under 1¼ in in size, the inside of every railroad car is oil-sprayed at 6 gal for a 50-ton hopper and 7.6 gal for a 70-tonner. Cost is about 1c per ton.

►Deep Mining, Preparation

Old Ben Gets New Look, Plans for Long Productive Life . . . . . p 76

A. E. Flowers, Associate Editor, *Coal Age*

Continuous miners, rope belts and improved preparation facilities have been added at Old Ben No. 9 to revitalize an old property. Peak output for one machine

(Continued on p 7)

COAL AGE, February, 1957, Vol. 62, No. 2. Published monthly on the 1st with additional issue in Mid-July by McGraw-Hill Publishing Co., Inc. Publication office, 1309 Noble St., Philadelphia 23, Pa. Subscription price $5 per year in the U. S. Second class mail privileges authorized at Philadelphia, Pa.

REMINDER LIST
of maintenance steel products

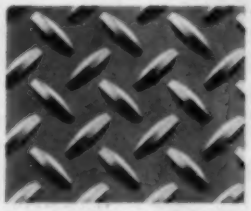
You can save time and trouble in the weeks ahead if you will take a minute now to review your coming requirements for maintenance steel products.

All the products listed below are in good supply at Ryerson right now, and, of course, we have many other maintenance products ready for quick shipment as well — boiler tubes, chain and accessories, tool steel, etc.

When you combine all maintenance steel requirements on one order you may save more than purchasing time. Freight costs may be lower, and prices, too, under the Ryerson quantity differential plan.

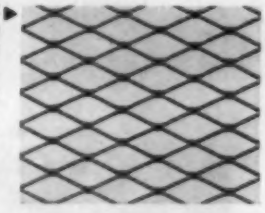
Perhaps this list will suggest ways to plan ahead and save

COLD FINISHED SHAFTING—Ryerson stocks of turned, ground and polished bars (C-1025, C-1045 and C-1141) provide a ready source for shafting of outstanding size accuracy, straightness and concentricity. For greater strength draw on Ryerson stocks of heat treated Rycrome—a medium carbon alloy.



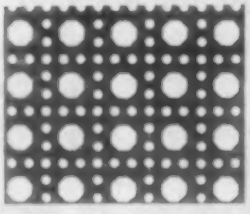
SAFETY PLATE—Tough, rolled steel plate with the Inland 4-WAY safety pattern is available in two pattern sizes for industrial flooring, stairs, ramps, platforms, etc. Firesafe, long wearing, easy to clean, it provides good traction for feet or wheels and presents an attractive appearance. Easy to fabricate and install.

EXPANDED METAL—Furnished in two basic types, standard and flattened, Ryex expanded metal is light yet strong and rigid—easy to handle because all sharp edges have been removed. Use it for room enclosures, machine guards, grilles, shelves, bins, etc. Also available: Ryex expanded metal grating.



WELDED GRATING for strong, rigid and durable open steel flooring is available from Ryerson in stock size panels and sizes tailor-made for your job with all necessary cut-outs and banding. Easily installed and maintained, Ryerson welded grating can be furnished painted or galvanized. Send for engineering data.

STAINLESS PIPE & TUBING and fittings as well, are on hand in a complete range of types—304, 316 and 304-L for welding applications involving severe corrosion, and in a comprehensive range of sizes including schedules 5, 10, 40 and 80 pipe sizes. Valves and welding and screwed type fittings also available.



PERFORATED SHEETS are on hand for immediate shipment in standard cane and machine guard patterns. And you can also get quick service on a wide variety of other patterns perforated to order from large Ryerson stocks of carbon steel and stainless sheets and plates. Send for descriptive literature.

GALVANIZED SHEETS—Tight-coated galvanized that forms without flaking is available in a wide range of gauges and sizes. Sheets take paint or lacquer readily without "weathering." And for roofing, siding, etc. they can be furnished with standard corrugation or with the attractive new mansard corrugation.

GLYCO BABBITT METAL AND RYERTEX BEARINGS—Glyco Babbitt, produced in our own foundry from top quality virgin metals, is available in five grades to meet every babbitt bearing requirement. Ryertex plastic bearings which need only water lubrication can also be furnished promptly—in any size or shape.

RYERSON STEEL

In stock: Bars, structurals, plates, sheets, tubing, alloy and stainless steel, re-bars, machinery and tools, etc.

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was 1,180 tons in pillar work. Rooms have been lengthened to 525 ft with the aid of the extensible rope belt. Pillar work has been simplified and overall recovery has been 83.7%.

New dense-media cleaning section rounds out preparation facilities and prepares a 6x3½ with an ash of slightly over 7%. Automatic density controls simplify bath regulation.

Sidelights—Continuous-miner production for 9-mo period; size consist in development and pillar recovery; saving manpower with diesel switcher; and teaming safety meetings and bonuses for better results.

►Underground Dust Control

How Britain Controls Dust . . . . . p 86

William Boyle, National Coal Board

New law imposes stricter requirements. Prevention of dust formation the first line of attack, with data still needed on how dust is formed. Water the major agent in suppression, with wetting agents a possible aid, depending upon circumstances. Infusion, either static (straight pressure) or pulsed (with the aid of the explosive) widely and increasingly used for suppression. Other methods are wet cutting, steam suppression, foam suppression, wet drilling, dry drilling with special dust collection, and spraying in haulage.

Notable Ideas—The duties of the mine manager in dust control; load-actuated unit for automatic control of belt spray.

►Success Story

How Diversification Pays Off . . . . . p 94

W. A. Raleigh Jr., Assistant Editor, *Coal Age*

The Philadelphia & Reading Corp. has risen from the doldrums of despair to the top anthracite production and sales spot, with 1956 production estimated at 4,743,386 tons and sales at 5,002,753 tons. Recovery has been achieved by diversifying income through acquiring underwear and boot makers; by reducing large coal inventories and other overhead costs; and by developing growing markets in steel and export. Future progress is geared to increasing fine-coal production for sintering and to large-scale research into gasification.

Along the way—What the four key men behind the P. & R. recovery look like and have done.

►Overburden Preparation

New Drill Helps Tasa Dig Deeper . . p 98

New vertical rotary broke drilling bottleneck that developed shortly after 18-cu yd shovel started at Bortz

(*Continued on p 11*)

This Month in Coal

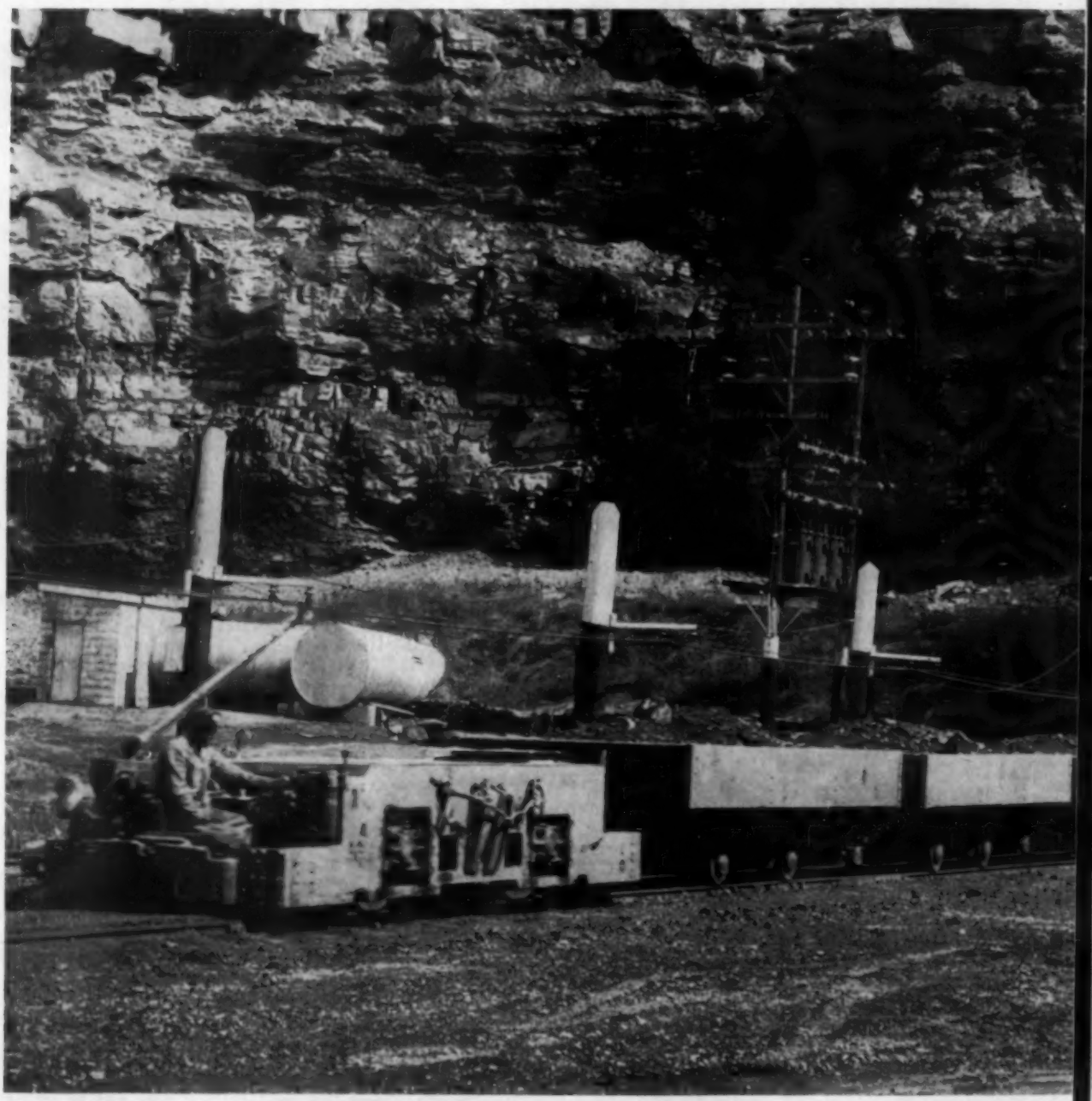
Oil, Gas and Congress—When the 85th Congress resumed in January the flood of bills reached a new record. The flood still is unabated, meaning also a new record in mortality is in the making. If they survive, some of the bills could benefit coal—for example, restriction of oil imports and freeing of wellhead gas prices from federal control. Chances for action? As long as flow through the Suez is cut off or restricted, not good for import restriction. Afterward, if dumping is resumed (odds are that it will be) a good possibility for restriction by legislation or administrative action. On wellhead gas prices, indications are that the Congressional and White House climates have changed, raising the prospect that favorable action is in the cards.

More to Come—Actions already announced and others in the arrangement stage indicate that coal still is determined to build competitive strength against gas and oil by building corporate strength, either through the development of additional productive capacity within the existing corporate framework or by combination or merger. In more instances than not it is both, though the yearly increase in concentration still is rather modest. For example, data compiled by *Keystone Coal Buyers' Manual*, a *Coal Age* affiliate, shows that the top 15 bituminous groups turned out 35% of the 1956 tonnage, only a slight increase over 33% in 1955. But the way 1957 is starting out, the pace should get faster unless Congress or the Department of Justice changes the rules. Present indications are that nothing radical will be done.

New Campaign—The battle lines between the advocates of governmental ownership and operation of the electric utility industry, the private investors who now own the bulk of it, and such interested parties as the suppliers of fuel, including coal, will be more clearly drawn than ever in this session of Congress. Though the public-power group suffered a setback in the last session, it is back stronger than ever and, as last year, is resting its case on "the lag in developing nuclear power," which it has seized upon as the best way of getting the government to move back into the utility field. Beating the idea down will be harder this year since the Democratic majority in Congress is largely sympathetic.

Continuing Bottleneck?—On the basis of preliminary figures, bituminous coal broke 11 million tons one week (Dec. 22) in 1956. This, incidentally, was the first time since the week ending Sept. 12, 1952, though the industry nearly did it in December, 1955. This year, the increase averages out to more than half a million tons per week, and the 11-million mark may be broken several times . . . if the car supply permits. The shortage at the present time is still as great as it was in 1956. An improvement, industry experts feel, cannot be made until new cars are delivered at a rate of 2,000 a month. The present schedule is 1,000. Until there is enough cars, coal can help by quick loading, and by urging users to unload equally quickly.

EASIER STARTS and



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every Saturday afternoon

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Maintenance costs are lower, too.

TEXACO OLYMPIAN GREASE—equally effective in plain, cavity hub or anti-friction bearings—has high resistance to oxidation, does not separate in service or in storage, and *stays in* the bearings. You can count on long lasting protection, long life for bearings.

For your high speed anti-friction bearings—as in locomotives, cutters and other equipment—use *Texaco Multifak*. This is a multi-purpose grease that resists oxidation and guards against rusting. And because the one grease does many jobs, *Texaco Multifak* simplifies lubrication, reduces errors and lowers costs.

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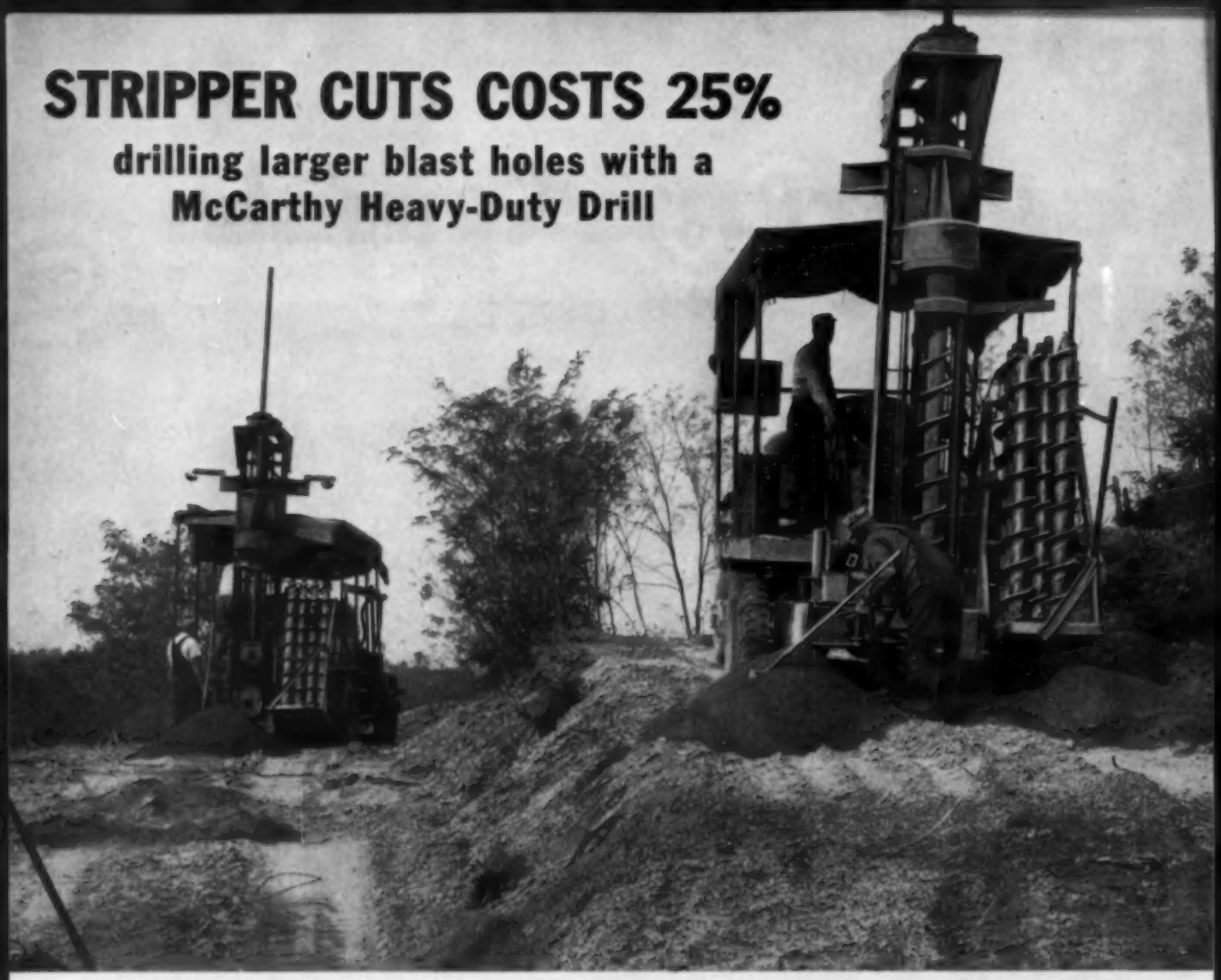
The Texas Company, 135 East 42nd Street, New York 17, N. Y.

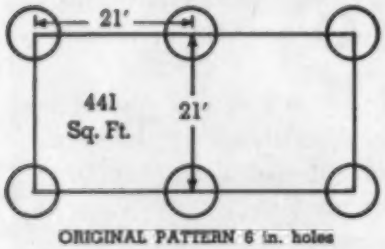
LUBRICANTS for the Coal Mining Industry

STRIPPER CUTS COSTS 25%

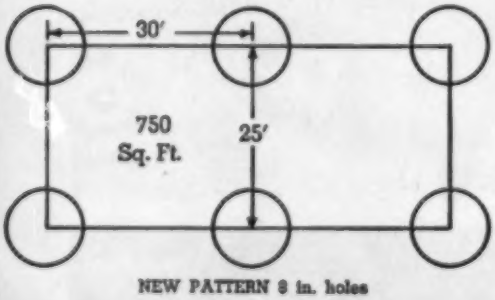
drilling larger blast holes with a McCarthy Heavy-Duty Drill



This strip mine operator cut drilling and blasting costs 25% by using this 25' x 30' pattern of 8 in. blast holes—drilled by two McCarthy Heavy-Duty Vertical Auger Drills.



ORIGINAL PATTERN 6 in. holes



NEW PATTERN 8 in. holes

A Southern Ohio strip mine operator cut his drilling and blasting costs by 25% when he widened the blast hole pattern and switched from 6 in. diam. to 8 in. diam. holes. He used McCarthy Heavy-Duty Vertical Auger Drills and a new type of explosive to remove the sandstone overburden.

A cost study made by the operator shows that the McCarthy drill bored the 8 in. holes at less cost than the 6 in. holes. Four 6 in. diam. holes covered 441 sq. ft. Four 8 in. holes covered 750 sq. ft. Since fewer 8 in. holes were required to drill the same area, over-all drilling time was cut in half. In each pattern, the amount of hard rock drilling was the same. The study included five work shifts of two McCarthy Model 106-24 Auger Drills, one using 6 in. and the other using 8 in. flights. The stripper figured all drilling and blasting costs, including fuel, labor, bits, explosives, etc. Over-all cost saving was 25%.

McCarthy Heavy-Duty Vertical Auger Drills drill up to 24 in. diam. holes faster than any other auger drill. Start cutting your costs now by phoning the nearest Salem Tool representative. Or write for Bulletin M-100.

Manufacturer of Drilling Equipment Since 190

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THE SALEM TOOL CO.

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This Month in Coal Age

CONTINUED

mine. The new drill makes it possible for two men to sink 1,200 ft of hole a shift. A 50-ft hole can be drilled without stopping and pressure on the bit is controlled automatically.

Drilling, stripping and loading take place in a pit 2,500 ft long and all equipment must mesh smoothly for uniform production. Flexible coal loading is a key factor in a smooth mining cycle.

Sidelights—How an automatic water neutralizing device feeds lime into acid water; how a skid-mounted boom simplifies cable handling in the pit.

The Coal Commentator . . . . p 12

Preventing prop dislodgment in shooting; plain and rubber-covered steel strands for belt conveyors; the Pennsylvania bituminous contribution to energy supplies; the outlook in state legislatures in 1957; keeping down spare parts inventories.

Editorials . . . . . p 53

Coal progress in mining, preparation, safety and marketing in 1957; plans for capitalizing on the opportunities of the future.

Foremen's Forum . . . . . p 104

Improving Local Communications Between Management and Labor

Thomas A. King, Safety Inspector, Emerald Coal & Coke Co.

Operating Ideas . . . . . p 108

Belt saddle at loading station easily moved; hand-pulled rockduster serve continuous mining; drag speeds cable-handling on highwall; skid-mounted boom eases cable-handling in pit; belt winder speeds belt recovery; precast slabs form roof in underground office.

Equipment News . . . . . p 112

For All Mines—Bin system for uniform blending of discharge, spray nozzles, flexible coupling, face-mask respirator, refuse cars, etc.

For Deep Mines—Shaft mucker, shaft jumbo.

For Strip Mines—Mobile rotary, rock-drilling crawler, tractors, truck-cab air conditioner, compressed-air filters, truck body hoists, and more.

News Roundup . . . . . p 134

Washington developments, including gas, oil and merger legislation; freight-rate developments; field activity in mergers and the development of new properties; latest personnel changes; and the regular monthly features; coming meetings, preparation contracts, equipment approvals, patents, books, foreign news, etc.

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COAL AGE VOLUME 62 — FEBRUARY, 1957 NUMBER 2

(with which are combined The Colliery Engineer and Mines and Minerals)

Published monthly on the 1st, with an additional issue in Mid-July by McGraw-Hill Publishing Company, Inc., Publication office, 1309 Noble St., Philadelphia 23, Pa. Subscription price, $3 per year in the U. S. Second class mailing privileges authorized at Philadelphia, Pa.

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Publication Office, 1309 Noble St., Philadelphia 23, Pa. Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator.

Subscription: Address all correspondence to COAL AGE—Subscription Services, 330 W. 42nd St., New York 36, N. Y.

A McGRAW-HILL PUBLICATION

Member of Associated Business Publications and Audit Bureau of Circulations

Allow 1 month for change of address. Subscriptions are solicited only from management, production and maintenance executives and engineers in the coal mining industry. Position and company connection must be indicated on subscription orders.

Single Copies: U. S. and possessions and Canada: 50c; all other countries, $1.50.

Subscription rates: United States and possessions and Canada, $3 for one year, $4 for two years, $5 for three years.

Other Western Hemisphere and the Philippines, $10 for one year, $16 for two years, $20 for three years. All other countries, $15 for one year, $25 for two years, $30 for three years.

Entered as second class matter May 4, 1961, at the Post Office, Philadelphia, Pa., under the Act of March 3, 1879; Printed in U.S.A.

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COAL AGE articles are indexed regularly by Engineering Index, Inc., COAL AGE's own index is published annually in December.

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The Coal Commentator

Props on the Job

If you want to, you can. That is true of many things, especially safety and particularly mine safety. A recent example is provided by The Hudson Coal Co., via **The Safety Commentator,** Vol. 19, No. 4. It notes that after five fatalities in the first 4 mo of 1956 management and men decided on drastic action. As a result there were no fatalities after April 6 in 1956. Ways and means? Thorough roof testing, removal of all loose material and the immediate installation of timbers regardless of roof condition.

As a by-product, Hudson has been experimenting with a modification of a U. S. Bureau of Mines idea for the prevention of prop dislodgement as a result of shooting. Good results are reported not only from the standpoint of keeping props on the job but also because it is not necessary to pick them up and set them a second time. As Commentator Editor Karl Miller observes:

"Once it becomes general to stand props as soon as room is available and secure them against dislodgment, we can expect an improvement in roof control and a consequent decrease in roof-fall injuries."

He has something there.

New Contender

The rubber belt has proved itself as a reliable and economical conveying medium. It has competitors, however. Steel strip is one. Two recent developments are evidence of the continued interest in developnig a satisfactory steel strand. One was the granting of a patent (No. 2,774,462) on Dec. 18, 1956, to W. N. Poundstone (assigned to Pittsburgh Consolidation Coal Co.) for an extensible belt conveyor using a steel ribbon.

The second development was the issuance of Inf. Bull. No. 56/174 by the National Coal Board of Great Britain on trials of the Sandvik rubber-covered steel belt at Woodside No. 5 colliery. The belt is 32 in wide. The conveyor is 1,800 ft between pulley centers, 366-ft lift, and has a capacity of 275 tph at 420 fpm. The initial belt went into service in August, 1954, and ran into a number of difficulties. The advantages, including ability to handle 18- to 24-in lumps without spillage, were so great, however, that it was decided to continue with a new band. It went into service in December, 1955, and "has been working satisfactorily since that date."

Since conveying is becoming more and more a key operation in mining, the steel band may bear watching.

The First Eight

Any way you look at it, it's a lot—the 7,999,999,999 tons of coal before the eight billionth that came out of a Pennsylvania bituminous mine late in December, 1956. In terms of oil, it adds up to 36 billion barrels, or the entire production of the United States since 1935. This points up the magnitude of Pennsylvania's contribution to the energy supply.

What of tomorrow? More of the same is the happy answer, not only for Pennsylvania but for all the coal-producing states, especially those east of the Mississippi River but also increasingly so for others in the coal bearing group. This becomes plainer and plainer as the record is studied, including the review of 1956 and of prospects for 1957 starting on p 54 of this issue. Coal has a clear cost advantage in the major consuming markets now and that advantage will increase. **Coupled with ample reserves, continued emphasis on quality, and improved sales and service setups, this cost advantage means not only a wider horizon as a fuel but also as a raw material for chemicals and other products, including, even, synthetic gas and gasoline.**

States Too

The legislatures will meet this year in all states but Kentucky, Mississippi and Virginia. What will they be wrestling with? The following are a few though by no means all of the proposals they will consider:

Higher taxes to defray higher expenses in all every direction. This will be a goal of municipal and local governments as well.

More borrowing to close the gap between receipts and expenditures and defray public-works costs.

Air and water pollution controls.

Liberalization and broadening of unemployment compensation.

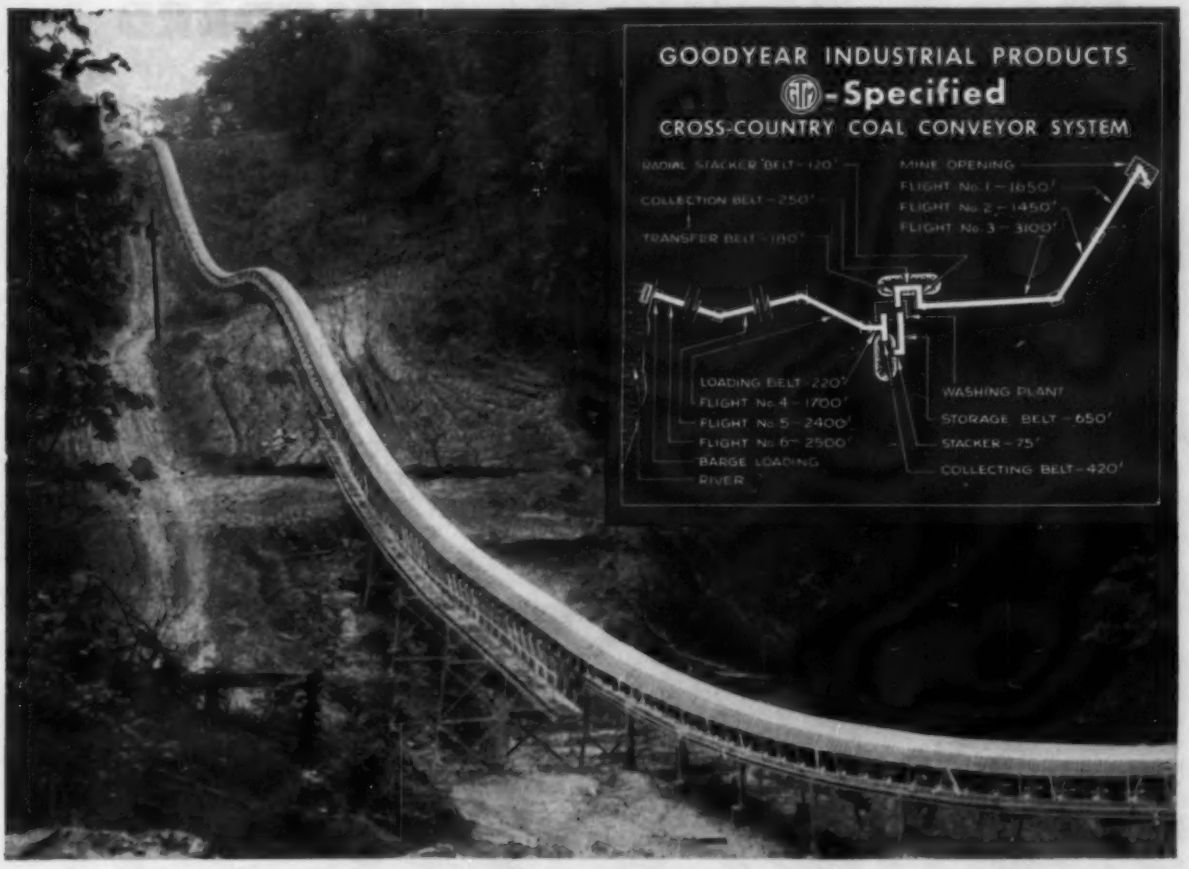
Increased workmen's compensation payments, along with sickness and temporary disability benefits.

It looks like a year of major new assaults on the taxpayers' pocketbooks, which is another good reason for keeping track of things—and for making sure that your representatives know how you stand.

Second 67

"With money scarce and expensive, corporate treasurers are looking critically at the frozen cash in 'operating spares.' Operating men in establishments from putty-knife factories to coal-preparation plants like to carry abundant spare parts to keep the operation going steadily. It's a good policy but carried too far it's a luxury." So notes Edward T. McNally, president, McNally Pittsburg Mfg. Corp., in making the point that one hedge against heavy inventory is using the spare-parts banks of the manufacturers.

The medium for this pertinent observation was the MacPitt digest of industry publications, *B.t.u.*, which also notes that MacPitt history goes back 67 yr. to the time when Thomas McNally Sr., whose son Thomas McNally Jr. is now chairman of the board, set up a boiler shop for the booming coal industry around Pittsburg, Kan. Growth and evolution brought erection of the first all-steel tipple 33 yr ago, marking the company's entrance into the field of coal preparation. **It is still adding to a long list of significant achievements as it begins a second 67.**



"Rubber Railroad" brings river to mine door—2½ miles away

A major coal company faced a major problem with the opening of a new mine in an isolated section of Western Kentucky. Success of the mine depended on their ability to take advantage of the low cost of barging the coal down the river—some 2½ miles away.

Wheeled transportation was considered for the long haul over the heavily wooded, roller-coasting hills. But there were two serious drawbacks. First, the rough terrain would require a winding route and long trip times. Second, the company would lose some excellent, natural stock pile locations.

Then someone thought of conveyor belts and the G.T.M.—Goodyear Technical Man. He not only confirmed the idea, but supported it to the hilt with the successful records of many similar cross-country conveyor belt systems. Result: The coal now rides to the river on rubber at the rate of 900 tons per hour in a smooth, profitable operation.

How can the G.T.M. and his conveyor belts help you with your haulage problems? It will be worth your while to find out by contacting him through your Goodyear Distributor or

Goodyear, Industrial Products Division,
Akron 16, Ohio.

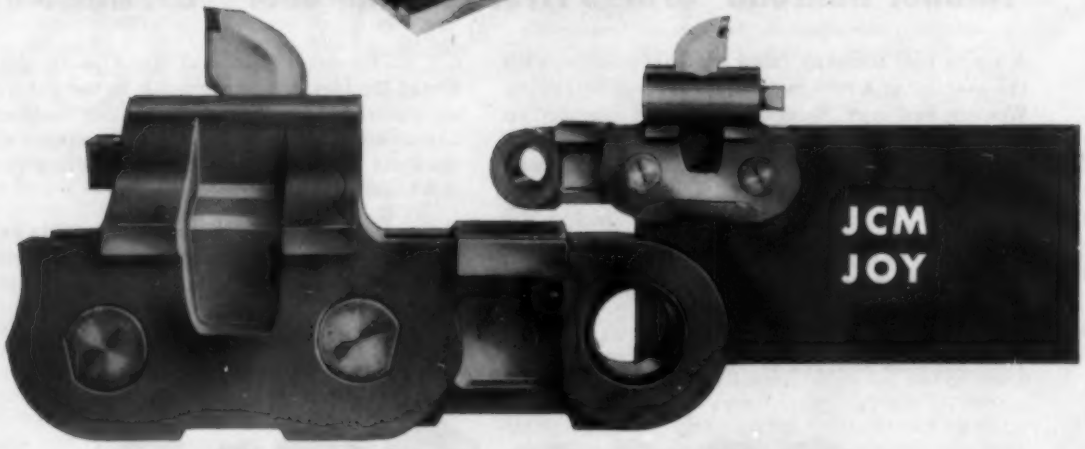
GOODYEAR

THE GREATEST NAME IN RUBBER

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

Wire Sculpture by Henry Saxfars

PROX sets a NEW HIGH STANDARD FOR PRODUCTION in a complete line of proven equipment for continuous miners



PROX

FRANK PROX COMPANY, INC. • TERRE HAUTE, INDIANA

Consult your nearest PROX SALES REPRESENTATIVE for complete information:

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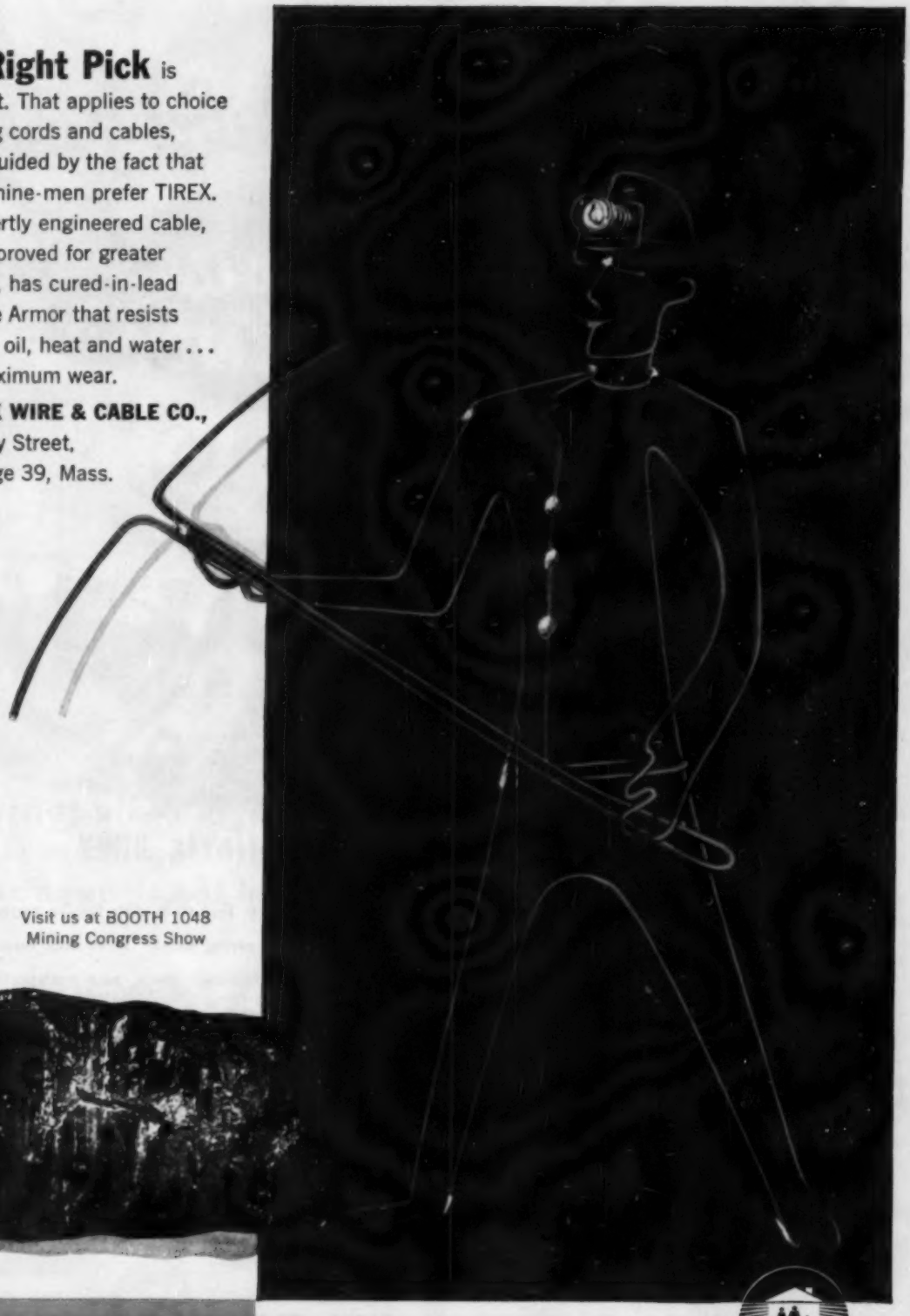
Wire Sculpture by Henry Szafarz



The Right Pick is important. That applies to choice of trailing cords and cables, too. Be guided by the fact that veteran mine-men prefer TIREX. This expertly engineered cable, newly improved for greater flexibility, has cured-in-lead Neoprene Armor that resists abrasion, oil, heat and water . . . gives maximum wear.

SIMPLEX WIRE & CABLE CO.,
79 Sidney Street,
Cambridge 39, Mass.

Visit us at BOOTH 1048
Mining Congress Show

LIVE BETTER ELECTRICALLY

Simplex—TIREX

Time is Money - SAVE IT

with the **Lee-Norse BUS & JITNEY**

Take a real good look at these LEE-NORSE "TIME-SAVERS"! Like modern misers they hoard minutes into extra productive hours by cutting portal to portal time—reducing costs—increasing tonnage output.

Lee-Norse MINE PORTAL BUS

(Locomotive Type)

This self-propelled Portal Bus for hauling section production crews to and from the face is unique with its split roof construction giving the driver an unimpeded, all directional view . . . the trolley is always within easy reach of the operator. Our standard low and high type Portal Bus operates in the majority of coal mines and will haul from 13 to 20 Men. This Portal Bus is powered with one (1) large motor (15 H. P.) and has two (2) independent braking systems for complete safety — (airplane-type) disc brakes hydraulically operated on each axle and dual mechanical hand operated service brakes on each wheel.

TIME IS MONEY — SAVE IT with the Lee-Norse Mine Portal Bus!

Lee-Norse JITNEY

Wherever they're in use—they're regarded as a time saving asset. Fleet and versatile the Jitney furnishes quick, sure transportation to and from the working face for key personnel, inspectors, engineers, etc. When required the Jitney can be pressed into service as an ambulance and is suitable for pulling fire fighting equipment.

TIME IS MONEY — SAVE IT with the Lee-Norse Jitney.

Write NOW for Literature

Lee-Norse Company

CHARLEROI, PA.

DESIGNERS AND BUILDERS OF THE FAMOUS LEE-NORSE MINER

No hydraulics to break, leak or freeze-up!
No small front steer-wheels to align!
No tie-rods to bend!
No springs to break!
No frame to warp!
No long drive-shaft to maintain!

Cuts your hauling costs!

Tournapull Rear-Dump overcomes most maintenance problems of conventional haulers

Construction of Tournapull Rear-Dump is radically different (and much simpler) than that of a conventional heavy-duty hauler. In place of a foundation frame and body sub-frame, Tournapull Rear-Dump hitches rear and front wheels through a horizontal yoke extending back from the kingpin, and pivoted to body itself just above and ahead of rear wheels. Body is simpler, much stronger . . . has no frame and sub-frame to get out of line.

Look at the photo above . . . note the absence of springs, spring hangers, and tie-rods. Low-pressure tires adequately absorb the shocks of rough haul-road travel and shovel loading. Eliminated are spring maintenance, replacement time, and cost of spring parts.

Front-wheel drive and kingpin-type power steer helps simplify Tournapull construction, too. No longer must power be carried back to the rear through a drive-shaft. Bearing and lubricating problems of a long drive-shaft are eliminated. No longer is steering handled by small front wheels subject to "bulldozing" and misalignment. There are no tie rods, no hinged steering connections to become twisted or bent.

Nor do you have the troubles of hydraulic hoists or gravity dumping with these Rear-Dumps. Dump is by an electric winch, that lifts the body up on twin cables. Operation is under complete control at all times — with positive power for dump and return controlled by an electric switch on the dash. There are no oil seals, hydraulic pumps . . . no high-pressure lines and jacks to keep tight . . . no freezing up in cold weather as with hydraulics. There are no shock loads as in gravity dumping. You save on regular maintenance time because there is no hoist mechanism to check . . . only a few places to inspect and lubricate.

Let us show you how these savings can put money in *your* pocket. For proof, we'll be glad to show you performance figures from a job like yours. Or, if you wish, we'll give you names and addresses of nearby owners of Tournapull Rear-Dumps, so you can check the facts for yourself.

Model D — 11 tons, 138 hp
Model C — 22 tons, 208 hp
Model B — 35 tons, 293 hp

Now available with optional tailgate. Prime-mover also powers interchangeable scraper, bottom-dump, flat-bed, crane, logging arch.

Tournapull—Trademark Reg. U.S. Pat. Off. R-1171-G-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

See how they anchor this frog

This frog is part of a spiffy new track layout designed by Bethlehem for a West Virginia mine. Boasting 85-lb Bethlehem rail, the layout is modern to the last detail.

Notice the frog plates indicated by arrows on the illustration. Those are Bethlehem Hook Frog Plates, and they hold a frog in place far better than regular track spikes ever could.

The hooks are larger and stronger than any spike head, and because they are integral with the plate they distribute track motion over a broader area of the tie. Thus the spikes which anchor the plate are freed from direct pull, and both vertical and lateral thrust are effectively held in check.

Because these plates are used in pairs (two plates fit neatly on a tie), they can easily be adapted to any frog position or angle. And they elevate the frog to keep it level with the running rail.

A Bethlehem mine-track engineer will be glad to go over the full story of Hook Frog Plates with you, to show how they can improve your haulage and cut down maintenance. You can reach him through the nearest Bethlehem office.

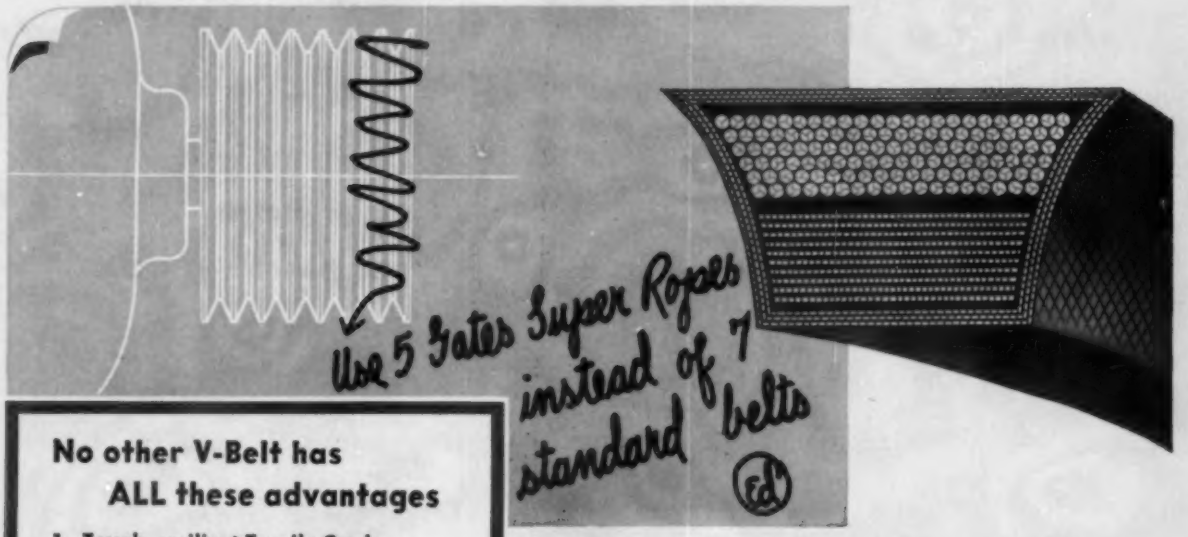
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Get more HP delivered per $ of drive cost

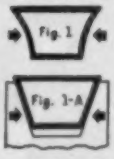


No other V-Belt has ALL these advantages

1. Tough, resilient Tensile Cords

Super-strength tensile cords provide 40% greater horsepower capacity . . . easily absorb heavy shock loads . . . reduce number of belts required . . . save weight and space.

2. Concave Sidewalls (U.S. Pat. 1813698)



Concave sides (Fig. 1) increase belt life. As belt bends, concave sidewalls become straight, making uniform contact with sheave groove (Fig. 1-A). Uniform contact means less wear on sides of belt . . . far longer belt life.

3. Flex-Weave Cover (U.S. Pat. 2519590)

A Gates exclusive provides greater flexibility with far less stress on fabric. Cover wears longer . . . increases belt life . . . more power available to driven machine.

4. High Electrical Conductivity

Built into Gates Super Vulco Ropes for safer drives (in explosive atmospheres).

5. Oil, Heat, Weather Resistant

Special rubber compounds make Super Vulco Ropes highly resistant to heat, oil, and prolonged exposure.

Cut sheave width and weight with Gates Super Vulco Ropes

You save on cost of iron . . . you reduce bearing width and support . . . you save space and overall cost . . . when you design a drive using Gates Super Vulco Ropes. Here's why:

5 Gates Super Vulco Ropes do the work of 7 standard V-belts

That's because Gates Super V-Belt has 40% more horsepower capacity than standard belts. Therefore, you can reduce sheave width and weight . . . cut cost.

A wealth of drive data is quickly available to you. Simply call your nearby Gates V-Belt Distributor (see 'phone book yellow pages) for a Gates V-Belt specialist. Stocks available in industrial centers around the world. The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-Belts.*

The Mark of Gates Specialized Research

TPA 91 A

Gates Super VULCO ROPE Drives

FAIRMONT

WORKS FOR COAL'S FUTURE!

FAIRMONT MACHINERY IS BUSTLING WITH ACTIVITY AS IT KEEPS PACE WITH AMERICA'S EXPANDING COAL INDUSTRY--AN INDUSTRY WELL ON ITS WAY TO NEW HIGHS IN TONNAGE PRODUCED

FAIRMONT-designed, FAIRMONT-constructed Preparation Plants

are very much in evidence over the country's coal fields . . . modern coal cleaning plants which are steadily pouring out the clean, well-sized coal so necessary to American progress.

Qualified by 60 Years of Experience

FAIRMONT

MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

Three of 69 standard model 25-ton Dart Trucks—all equipped with Fuller 4-MS-1440, 4-speed Transmissions—owned by Southern Peru Copper Corporation. This is part of a $2½-million order for 90 units, one of the largest of its kind ever placed.

FULLER Transmissions specified on $2½ MILLION TRUCK ORDER!

The Southern Peru Copper Corporation has ordered a fleet of 69 standard model 25-ton Dart Trucks, *all* equipped with Fuller 4-MS-1440, 4-speed Transmissions. This is part of a $2½-million order for 90 units, one of the largest of its kind ever placed.

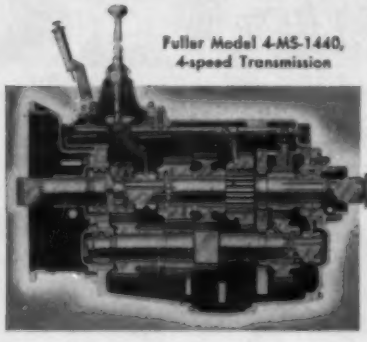
These trucks will be used for a dual purpose in the development of the huge Toquepala and Quellaveco copper deposits in southern Peru. First, they will help to remove the initial overburden, and later will haul copper ore from the open pits to the mine's concentrator.

The big, rugged, heavy-duty, off-highway Dart trucks—specifically developed for mining operations such as this—are designed and built to haul top payloads profitably, over the roughest terrain.

It is only natural then, that a dependable, durable, transmission was carefully selected to efficiently and effectively deliver power from the 335 hp Cummins N.R.T. Turbocharged diesel engine, through a Twin Disc Model CO Torque Converter. *That's why Fuller was specified!*

On job after job, where loads are the biggest and going is the toughest, you find Fuller Transmissions *putting horsepower to work efficiently and economically.*

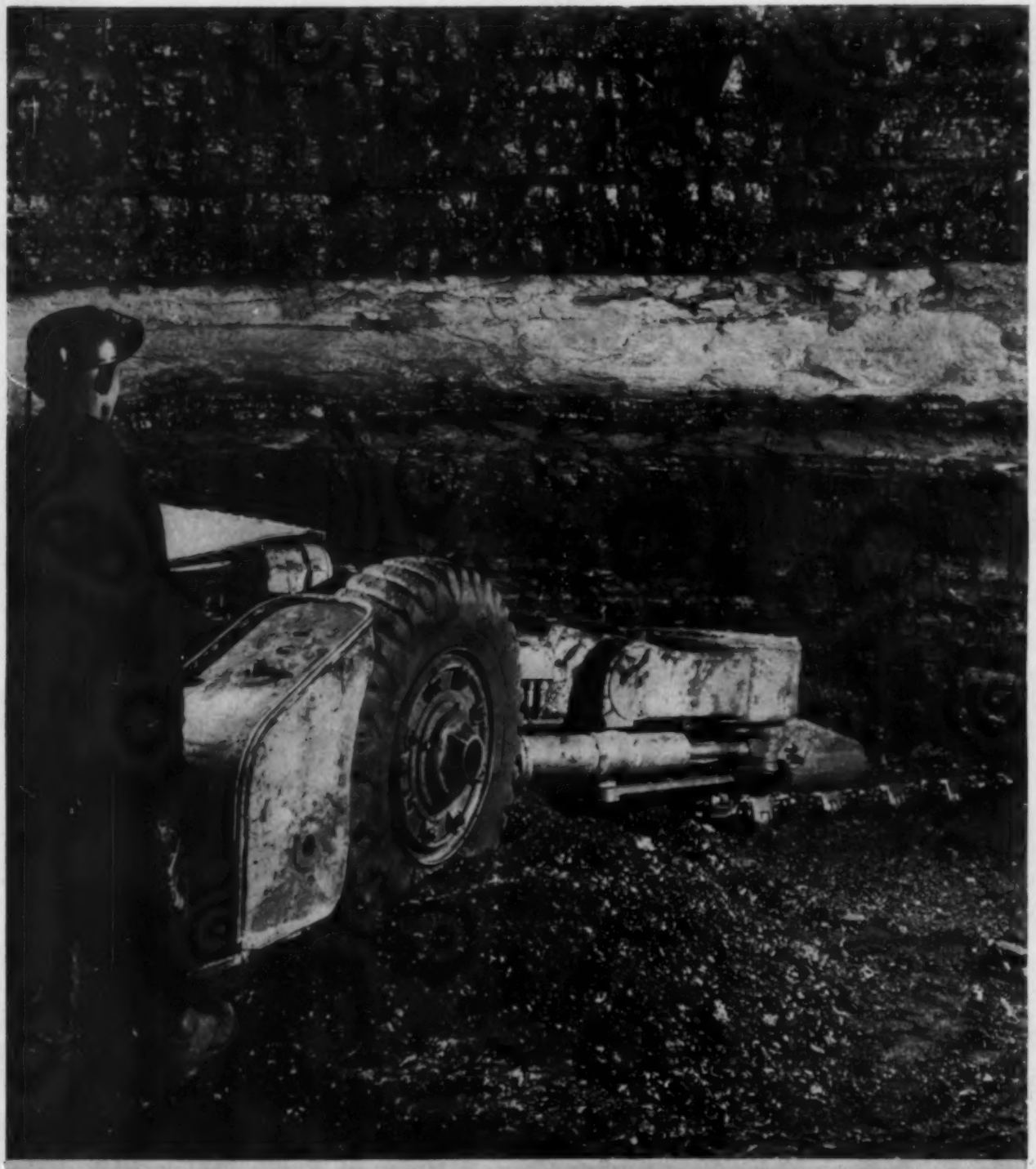
Next time you order heavy-duty construction equipment, *specify* Fuller Transmissions. From over 110 models available for rubber-tired equipment, there's a Fuller Transmission designed to do *your* job.



Fuller Model 4-MS-1440, 4-speed Transmission

FULLER MANUFACTURING COMPANY
Transmission Division, Kalamazoo, Michigan

Unit Drop Forge Division, Milwaukee 1, Wisconsin • Shuler Axle Company, Louisville, Kentucky (Subsidiary) • Sales & Service, All Products, Western District Branch, Oakland 6, California and Southwest District Office, Tulsa 3, Oklahoma.



BOTTOM CUTS—TOP CUTS—SHEAR CUTS and anything in between—

There are no "blind spots" with the Joy 10-RU. Has the powerful cutting action needed to cut out impurities . . . ideal for split-seam mining.

• Powerful, Profit-Making Universal Cutting Machine for your Trackless Mine. 623 of these Machines in Use Throughout the World—Proof of Industry-Wide Acceptance.

The JOY 10-RU

We've tacked up a "For Sale" sign to remind you to review your cutting methods—then take a look at the 10-RU*. Its rugged construction has made it the favorite of the men who operate the machines underground. Its long working life has made it the favorite of those who watch production costs.

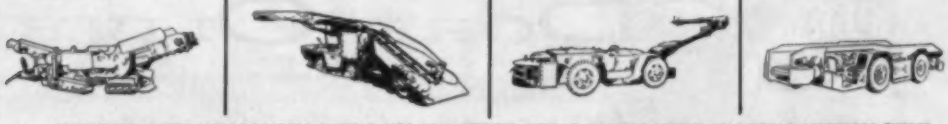
In medium-seam and thick-seam mines the 10-RU has earned a remarkable reputation as a "workhorse". It top cuts, center cuts, bottom cuts and shear cuts. No other cutting machine is as widely known, used, and favored.

Joy also builds the 11-RU for low coal and the 12-RB for very low coal . . . one of them will suit your operations perfectly.

*Write to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 150-1

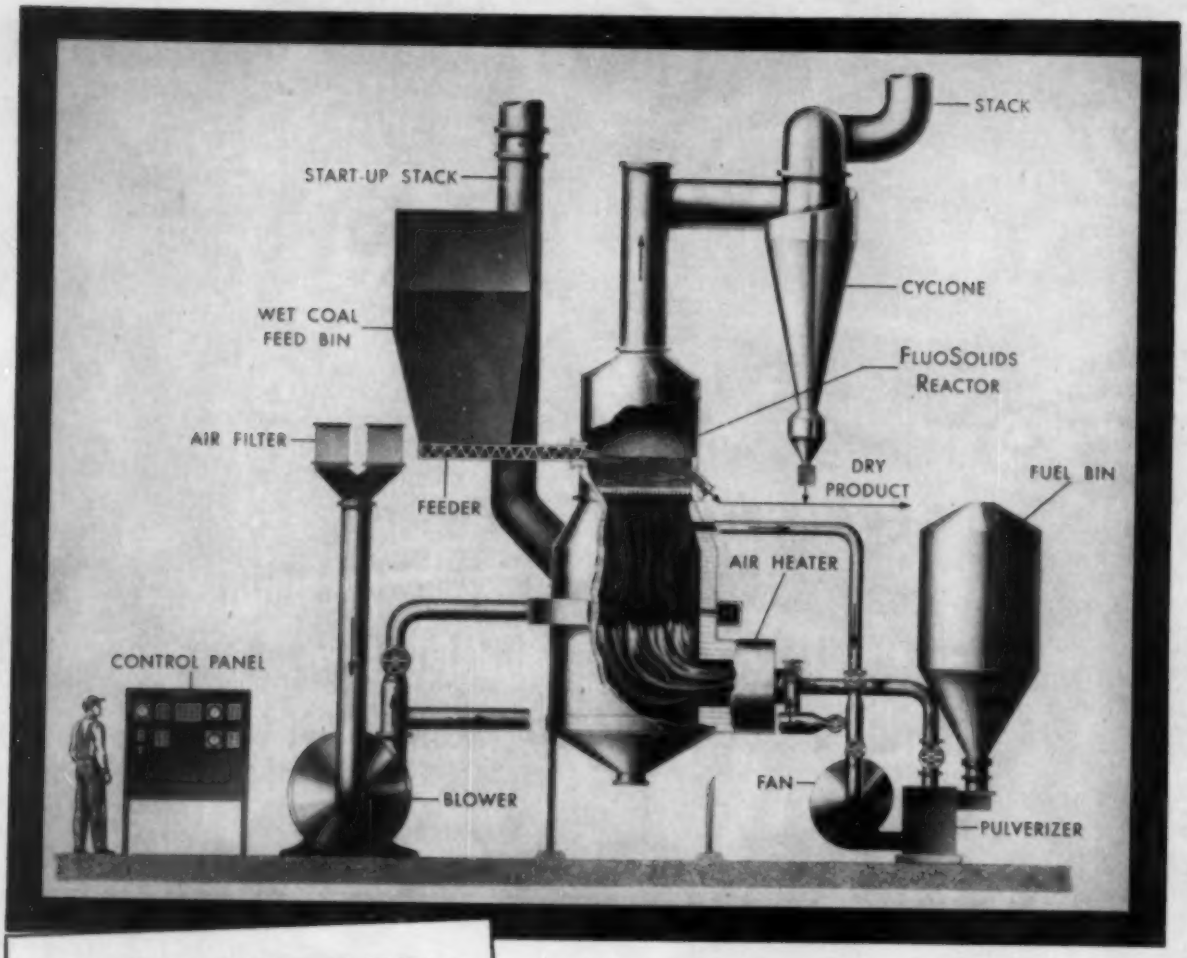
JOY EQUIPMENT FOR MINING... FOR ALL INDUSTRY



CONTINUOUS MINERS, MOBILE LOADERS, SHUTTLE CARS, COAL CUTTERS, CUTTING MACHINE TRUCKS, COAL DRILLS, CONVEYORS, TIMBER SETTERS, SHUTTLE CAR ELEVATORS, BELT FEEDERS, FANS, BITS, PORTABLE BLOWERS, COMPRESSORS ROCK DRILLS, HOISTS, CORE DRILLS

WDW CL6462-150

FLUIDIZED COAL DRYING



A PROGRESS REPORT...

The first Dorrco FluoSolids System for coal drying has been on stream since July, 1955. Operating information is now available to prove conclusively the advantages of fluidization compared with conventional thermal drying of coal. Located at Lynnville Coal Company, Lynnville, Indiana, the System has demonstrated that . . .

Steam Coal and Metallurgical Coal can both be dried successfully. Variations in sulfur from 0.6% to 4% and in inherent moisture from 3% to 9% have no effect on the operation.

Feed variations from 69 TPH to 107 TPH and total moisture variations from 10.1% to 22.4% are easily taken in stride.

Saturated stack conditions have prevailed during majority of operating time with relative humidity of the exit gases never dropping below 90% . . . indicating maximum air utilization and resulting in a clean stack.

100 tons per hour of ¼" x 0 coal is the average being handled and the entire drying system occupies only 1350 sq. ft.

If you'd like more information on this radical departure from conventional fine coal dryers, write for a copy of Bulletin No. 7503. Dorr-Oliver Incorporated, Stamford, Conn.

FluoSolids T.M. Reg. U. S. Patent Office

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

STANOLITH Grease gives coal a smooth ride

Over 5,000 bearings need just one grease. Never a bearing lubrication failure.

Part of the coal for the Wabash River Generating Station operated by the Public Service Co. of Indiana near Terre Haute, comes directly from the Viking Coal Mine Processing Plant via a conveyor system. The system operates 365 days a year moving up to 4,800 tons of coal per day. STANOLITH Grease has been used to lubricate all bearings in the conveyor system since February 3, 1953, the start up day. In all that time there has never been a bearing lubrication failure.

Prior to the initial operation of the conveyor system, maintenance supervisors checked with Paul Manning, Standard Oil industrial lubrication specialist, about lubricating the new installation. Paul, they knew, has extensive experience (21 years) in handling lubrication problems of this kind. Working with plant management, Paul recommended STANOLITH Grease No. 42 for the job. STANOLITH Grease has fulfilled maximum expectations.

STANOLITH Grease is a smooth textured grease. It is made from highest quality oil, lithium soap and special additives. It resists water washing and water contamination. STANOLITH Grease works well in exposed, outdoor installations. It will not channel. It is chemically stable. It can be applied easily by hand, gun or pressure system.

Find out more about STANOLITH Grease. Talk to your Standard Oil industrial lubrication specialist. There is one near you in any of the 15 Midwest or Rocky Mountain states. Or write 910 South Michigan Avenue, Chicago 80, Illinois.

***Quick facts about* STANOLITH Grease**

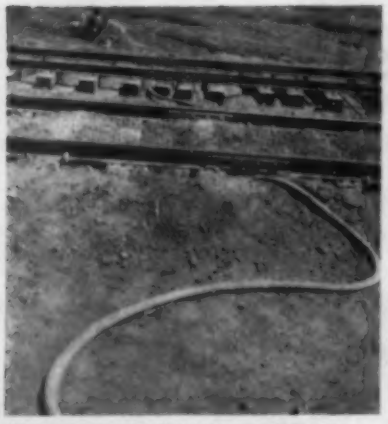
- Water resistant
- High temperature resistant
- Pumpable in grease gun or pressure system
- Mechanically stable

STANDARD

STANDARD OIL COMPANY

Part of coal conveyor system at Wabash Power Plant, Terre Haute. Entire conveyor is lubricated with one grease —STANOLITH. No bearing failures experienced during the 3½ years conveyor has operated.

Over-all view of mine. Each ore car in foreground contains about 60 tons of ore.



Tracks are constantly being moved as pit enlarges. Cables are moved with the tracks.

Cables lie in the sun or rain without any protection. They don't need any.

Shovel, being moved, carries 5000 feet of cable with it in the steel box.

Workman manhandles the cable trailing a churn drill as it heads for new location.

Notice long span of this cable bridge and extreme flexibility of cable in foreground.

Shovels lift up to 18 tons in one bite; they operate 24 hours a day.

Entrance poles and meter houses. Cables start from here, work at 440 or 4000 volts.

Iron ore mine finds Tiger Brand Amerclad *in use since 1928*

THE PICTURES show one of the greatest open pit iron ore mines in the world. From pole-head to meter house to shovels and drills, Tiger Brand Amerclad electrical cable serves as a flexible nerve system to supply the huge electrical requirements of machines that operate 24 hours a day in temperatures that range from 100° in the shade to minus 40° in the shoulder-deep snow.

Some of this cable has been in use since 1928, and it's still good.

Other cable is right in the blast area, where it is dragged over sharp rocks and pounded by dynamite-propelled boulders. Even this cable averages six to eight years of useful life.

Look at the pictures and read the captions that tell about operating conditions. You'll see why *no* heavy-duty electrical cable has a greater reputation than Tiger Brand Amerclad. Call your American Steel & Wire representative for the whole story.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS

UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS TIGER BRAND ELECTRICAL WIRE & CABLE

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB

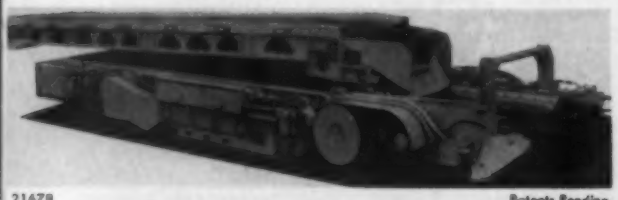
- asbestos wire and cable
- mold cured portable cord
- shovel & dredge cable
- paper & lead cable
- varnished cambric cable
- interlocked armor cable
- special purpose wire & cable
- aerial, underground and submarine cable

USS

UNITED STATES STEEL

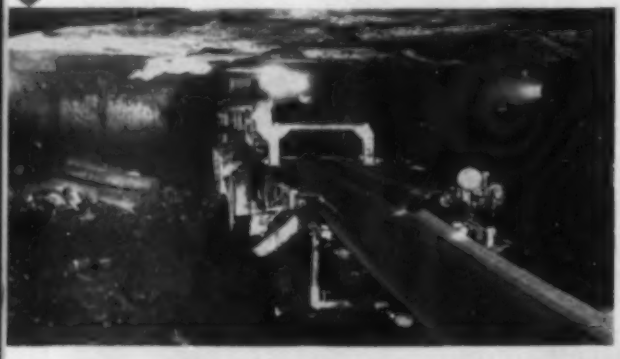
21668

The NEW Goodman ROPEX®



21679 Patents Pending

Bridge conveyor between tread mounted tail section and continuous miner swivels to right or left, has 13½-foot range of forward and back travel. Hydraulic driven drums on tail section store wire ropes that support carrying idlers.



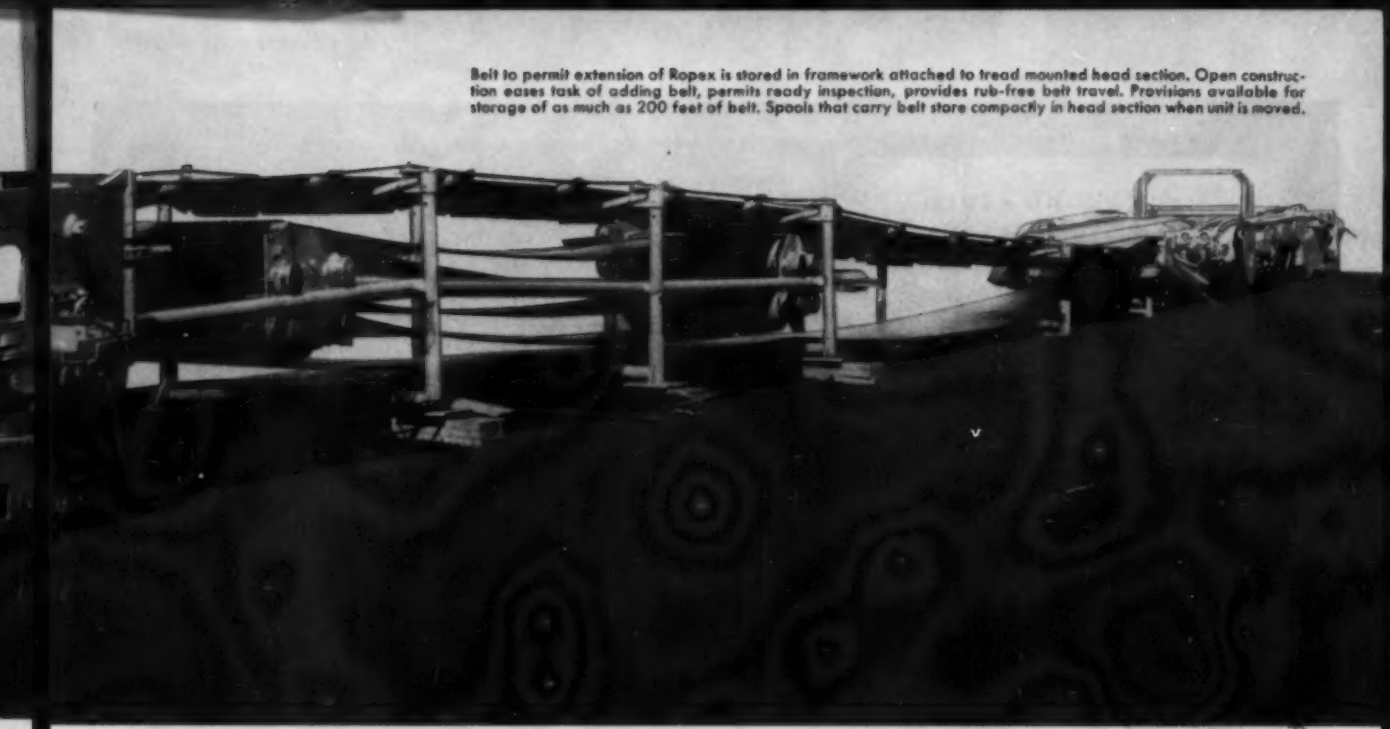
- Ropex is an extensible belt conveyor equipped with tread-mounted, motor-driven head and tail sections. The head section carries an ingenious arrangement of spools for belt storage. The tail section is equipped with winding drums for wire rope storage.
- Ropex is available for 48" and 72" seams and can be extended up to 1000 feet in length. Predetermined tension on both belt and wire ropes is automatically maintained during extension or retraction, loaded or unloaded.
- Ropex has no fixed structural framing . . . no rigid idler assemblies. Instead, parallel wire ropes carry chain-linked idlers over which the belt travels.
- Ropex is flexible . . . resilient. The wire ropes and hinged idlers "give" in accordance with the weight carried. The load rides smoothly, evenly, with nothing to cause shifting or spilling. At the same time, impact shock on bearings and belt is reduced to a minimum.

NOTE THESE GOODMAN "FIRSTS"!

- Goodman was first with the Rope Belt Conveyor, now widely used in coal and ore mines. Ropex is a development of this idea with the added feature of extensibility.
- Ropex is the first 36" width extensible belt conveyor in operation.
- Ropex is the first extensible belt conveyor with the capacity to handle the output of a Goodman Continuous Borer (8 to 10 tons per minute) or any other continuous mining machine.
- Ropex is the first extensible belt conveyor to provide for as much as 200 feet of belt storage in the head section for 100-foot extension without interruption to the continuous flow of coal.
- Ropex is the first extensible belt conveyor with open type belt storage.
- Ropex is the first extensible belt conveyor with adjustable height discharge.

With Ropex there is no rigid assembly along the belt line. Parts are few, lightweight, easy to handle and store. Labor for moving, installing and extending is reduced.

Patents Pending



Belt to permit extension of Ropex is stored in framework attached to tread mounted head section. Open construction eases task of adding belt, permits ready inspection, provides rub-free belt travel. Provisions available for storage of as much as 200 feet of belt. Spools that carry belt store compactly in head section when unit is moved.

Patented and Patents Pending

Extensible Belt Conveyor

moves coal from the face as fast as it can be mined by any Continuous Miner

Here is a fast, high capacity conveyor that actually extends itself . . . increases its own length . . . under its own power. It advances as the Continuous Miner advances . . . keeps pace with the face . . . eliminates delays and interruptions . . . provides a continuous flow of coal back to the out-of-mine transportation system.

The Goodman Ropex Conveyor is linked to a continuous mining machine by means of an independent motor driven bridge conveyor with a 13½-foot range of travel. As the mining machine advances to the limit of this range, the tail section of the Ropex Conveyor is trammed forward. Belting and wire rope pay-off automatically. Supporting stands and idler assemblies are added along the line as needed. Meanwhile the mining machine keeps right on cutting. The flow of coal need not stop for a moment during a full 100-foot advance. At that point a new section of belting is easily added and continuous operation is resumed.

The efficiency and smooth, continuous operation of the Goodman Ropex Conveyor have been thoroughly tested and proved. Now this most modern of all mining equipment is ready to serve you. Let us give you the story in full detail. Write, wire or phone today.

® Registered Trademark

GOODMAN

MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

Shuttles underground *without turning*

There's no room to turn in this mine tunnel — and no need to turn. Koehring Dumptor drives up to the tractor-shovel, body forward, gets its load — and then shuttles back out of the tunnel at the same speed as it entered. Dumptor operates with equal ease in either direction. It gets this no-turn operating advantage through a constant-mesh transmission that gives the same 3-speed travel forward and reverse. Dumptor no-turn hauling has gained wide acceptance in both underground and strip mining, as shown on these pages. It solves problems of operating along overhead trestles, on open-pit ledges, narrow haul roads — is especially practical for stockpiling. There's an important production advantage, too. Every turn eliminated cuts 15 seconds off cycle time. This adds up to a substantial increase in yards or tons hauled per hour. For example — by saving only 2 turns on a round trip, time studies prove that Dumptor often increases hourly yardage output more than 10% on an average 1000-foot haul. Better have your Koehring distributor show you what Dumptor no-turn hauling can mean on your mine, quarry or stockpile operations. He has some facts and figures that will interest you. Call today.

Elevated haul-way — On extensive stockpile operation, Koehring 6-yard Dumptor shuttles along overhead trestle. It travels from mine headshaft to edge of stockpile, dumps, and returns for next load — never turns. This trackless method replaced lorry cars at several mines. Some Dumptor owners set up access ramps, instead of using trestle systems.

Dumps in one second — Dumping off end of hillside trestle, operator drives up to hopper, trips the body-release lever, and *gravity* dumps the 6-yard load instantly. One second later, Dumptor is on its way back. There is no 15 to 25-second wait for slow-acting body hoists. Koehring *gravity-dump* works every time — never balks, and never wears out.

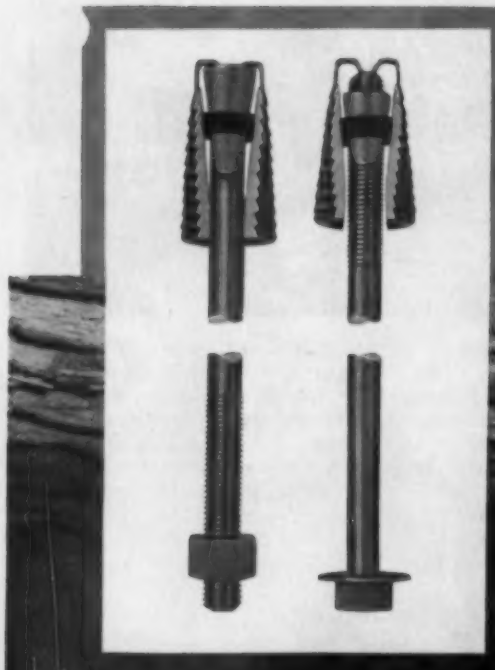
Big production team — Working with Koehring 1½-yard shovel, Koehring Dumptors are loaded with body forward, ready to travel and dump without turning. These heavy-duty haulers have better than 6 h.p. for every ton of loaded weight — accelerate fast, pull through soft ground, up grades and ramps with less shifting — climb 24% grades fully loaded.

Stockpile specialist — Dumptor puts stockpiling on a fast shuttle-haul basis — eliminates turning at the loader and on top of the pile. Notice how instant dumping action kicks the load out over edge of pile — saves a lot of dozer clean-up. Free-swinging kick-out pan breaks load suction in wet materials, bolts down to floor when handling rock.

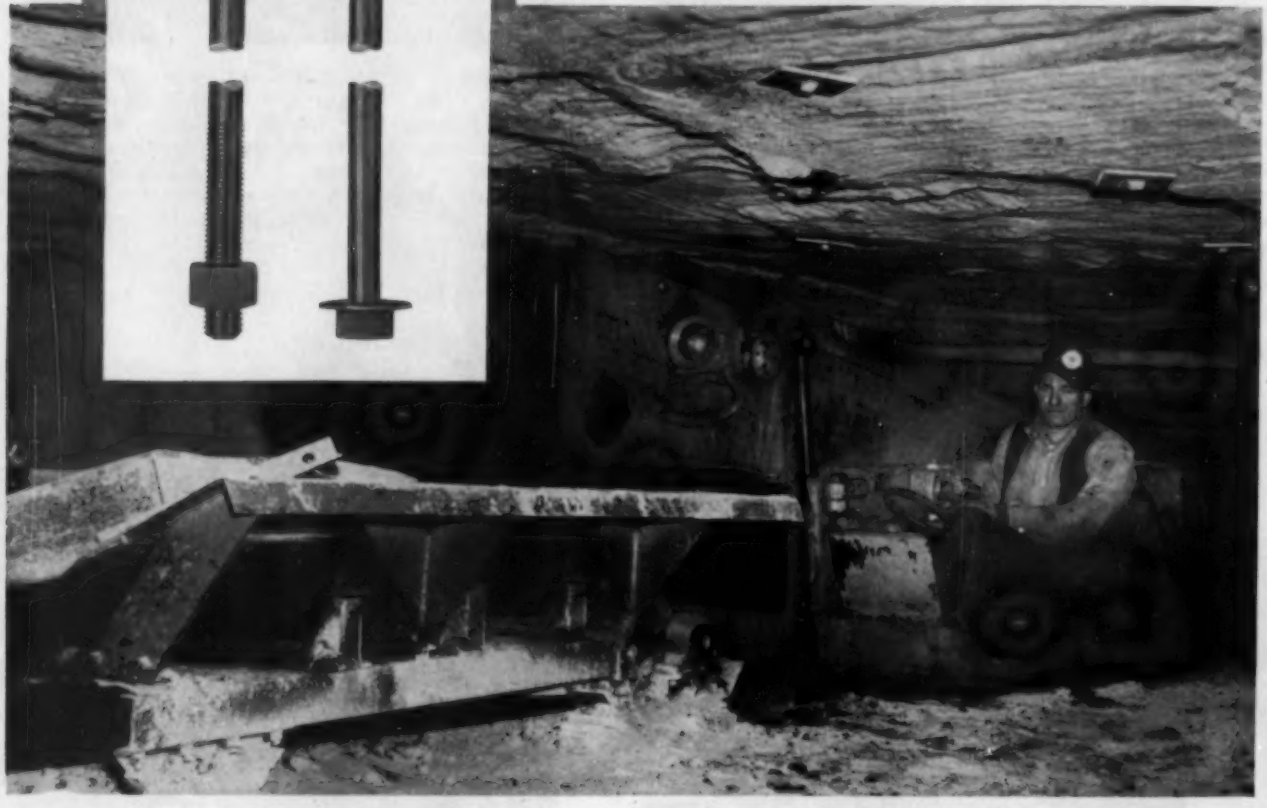
KOEHRING COMPANY, Milwaukee 16, Wis. Subsidiaries: PARSONS · KWIK-MIX · JOHNSON KOEHRING HEAVY DUTY K044

REPUBLIC

ARE MATCHED TO



A WIDE RANGE OF OPERATING REQUIREMENTS can be met by these two popular Republic Roof Bolt Assemblies. At left in photo is the exclusive forged wedge head bolt with rigid expansion shell. At right —the square head bolt with wedge nut and rigid expansion shell.



REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

ROOF BOLTS

OPERATING REQUIREMENTS

Whatever your mine roof conditions in terms of strata and headroom, wherever roof bolting is feasible, Republic can furnish the correct roof-bolt assembly to match your operating requirements.

For example, in low-roof areas such as that pictured at left, Republic's Square Head Bolt with Wedge Nut and Rigid Expansion Shell is ideal. It can be wrenched tight to the roof plate leaving no accident-causing projecting threaded ends. Maximum clearance is provided for movement of men and machines, and for improved ventilation.

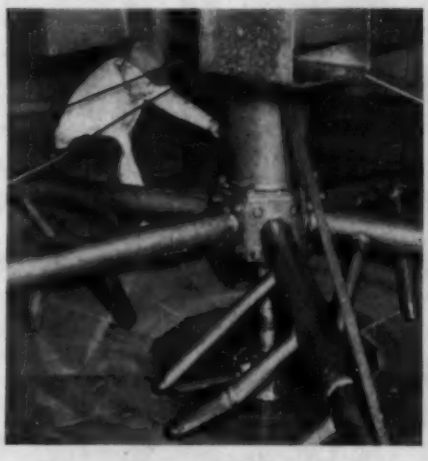
In high-roof areas, requiring an extremely strong, permanent anchor, Republic's exclusive Forged Wedge Head Bolt with rigid Expansion Shell is perfectly suited. In use, wedge head forces the deep, sharp serrations of forged shell solidly into hole sides in any strata to provide maximum holding power. Since no torque is applied to the bolt, its entire strength is devoted to roof support.

To meet still other requirements, Republic can furnish the slotted mine roof bolt and conventional bolt with expansion-sleeve shell as needed.

Whatever your roof bolting problems, it will pay you to specify Republic, the only complete line of mine roof bolts matched to operating requirements. Contact your Republic representative for complete information. Or mail the coupon for illustrated literature.

WATER-HANDLING OPERATIONS in the mine are greatly simplified through use of Republic Flexible Plastic Pipe. You simply install it and forget it. It is completely impervious to the corrosive elements normally found in mine water. In addition it is easily cut and joined, making relocation to meet changing conditions practical. For complete information on Republic Flexible Plastic Pipe, mail coupon, today.

COAL-WASHING OPERATIONS suffer far fewer interruptions when you specify equipment made of Republic ENDURO® Stainless Steel. Take this classifier, for example. Its bottom is made of solid ENDURO. In operation, it is subject to tremendous abrasion by a slurry mixture of coal, waste and water pumped from the revolving arms. ENDURO shrugs off this punishment—outlasts ordinary carbon steel many times.



STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
Dept. C-2993
3124 East 45th Street
Cleveland 27, Ohio

Please send me more information on:

☐ Mine Roof Bolts ☐ Flexible Plastic Pipe
☐ ENDURO Stainless Steel

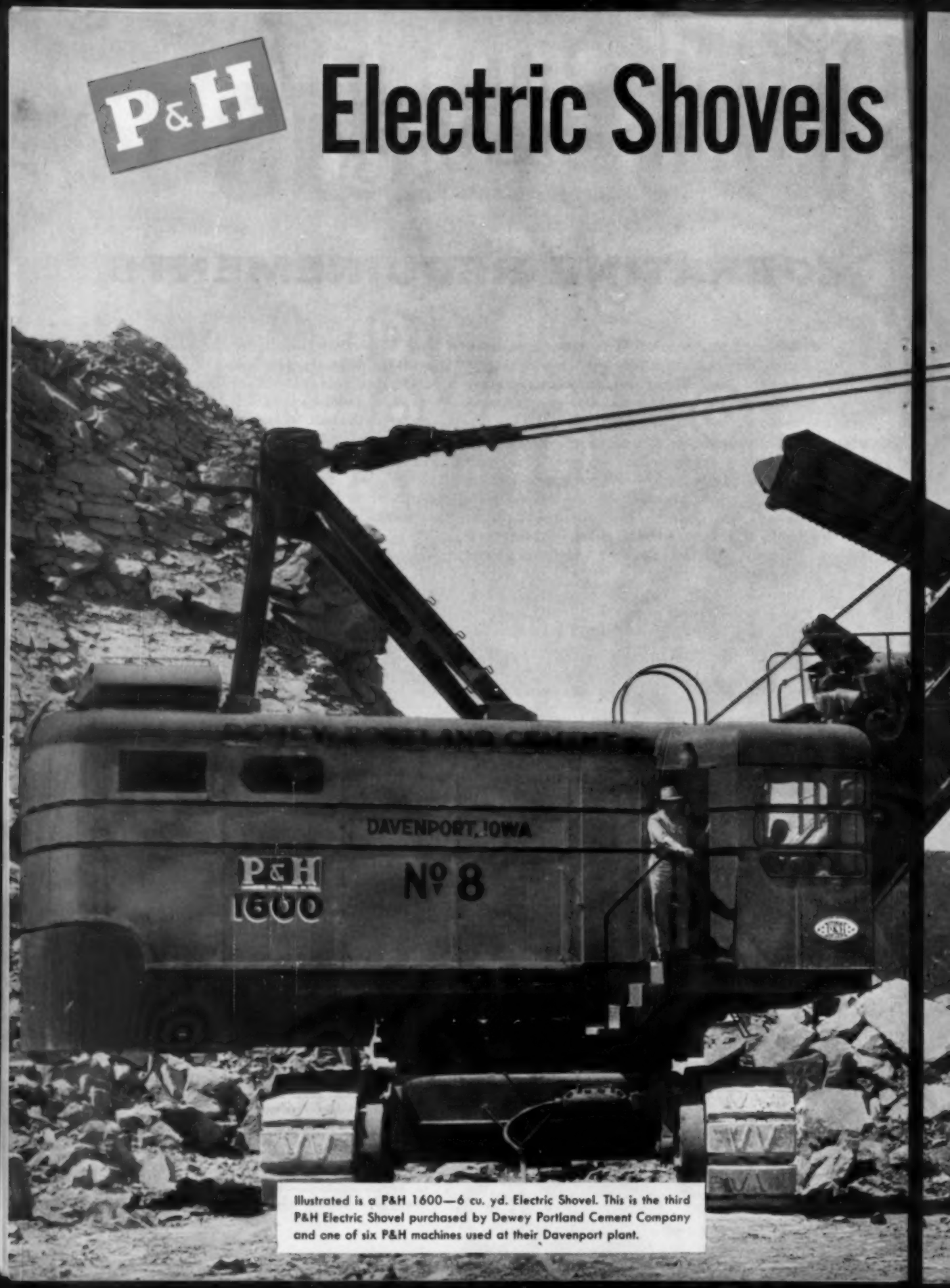
Name_____ Title_____

Company_____

Address_____

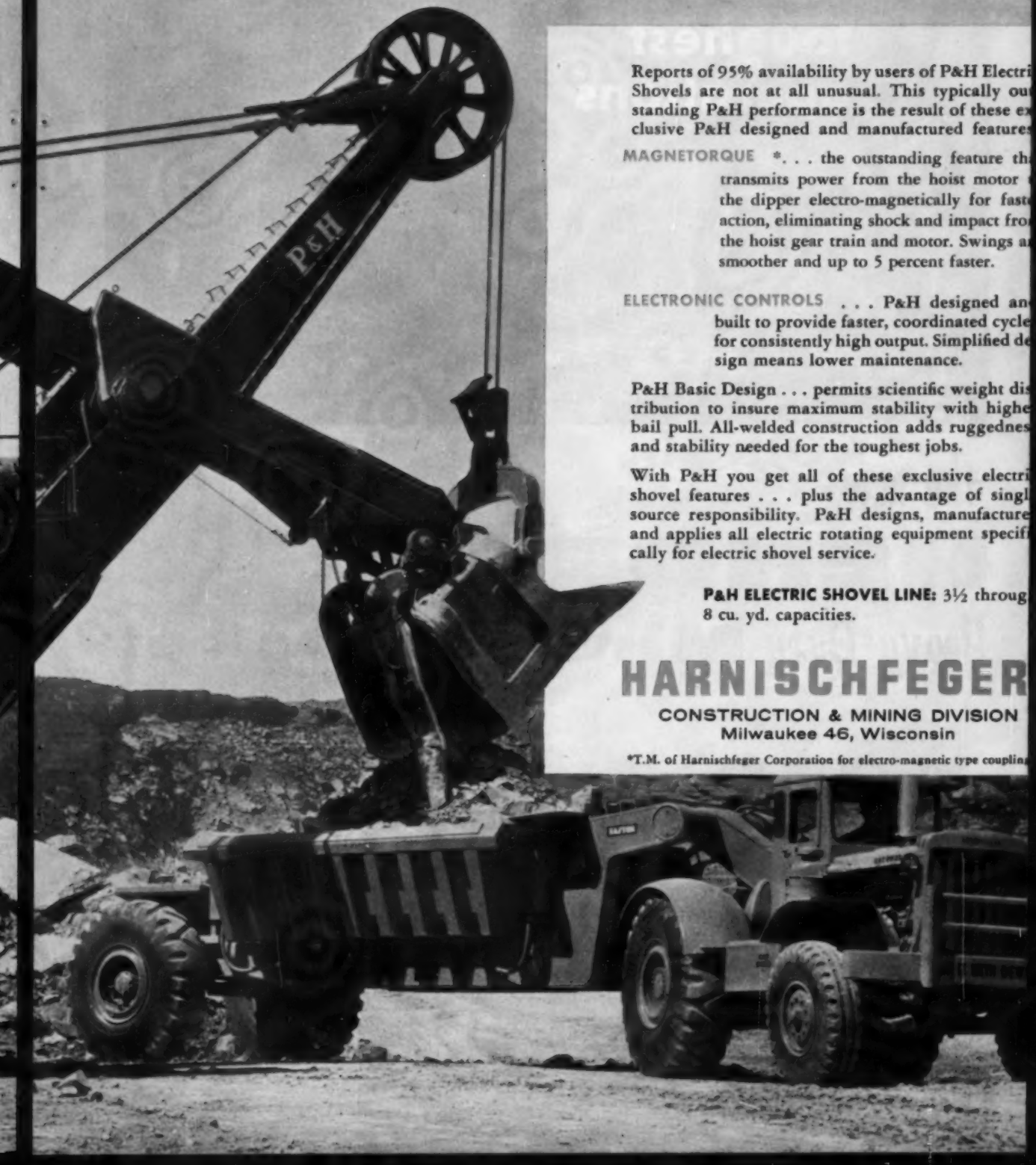
City_____ Zone____ State_____

P&H Electric Shovels



Illustrated is a P&H 1600—6 cu. yd. Electric Shovel. This is the third P&H Electric Shovel purchased by Dewey Portland Cement Company and one of six P&H machines used at their Davenport plant.

give you 95% Availability



Reports of 95% availability by users of P&H Electri Shovels are not at all unusual. This typically ou standing P&H performance is the result of these ex clusive P&H designed and manufactured feature

MAGNETORQUE *. . . the outstanding feature th transmits power from the hoist motor the dipper electro-magnetically for fast action, eliminating shock and impact fro the hoist gear train and motor. Swings a smoother and up to 5 percent faster.

ELECTRONIC CONTROLS . . . P&H designed an built to provide faster, coordinated cycle for consistently high output. Simplified de sign means lower maintenance.

P&H Basic Design . . . permits scientific weight dis tribution to insure maximum stability with highe bail pull. All-welded construction adds ruggednes and stability needed for the toughest jobs.

With P&H you get all of these exclusive electri shovel features . . . plus the advantage of singl source responsibility. P&H designs, manufacture and applies all electric rotating equipment specifi cally for electric shovel service.

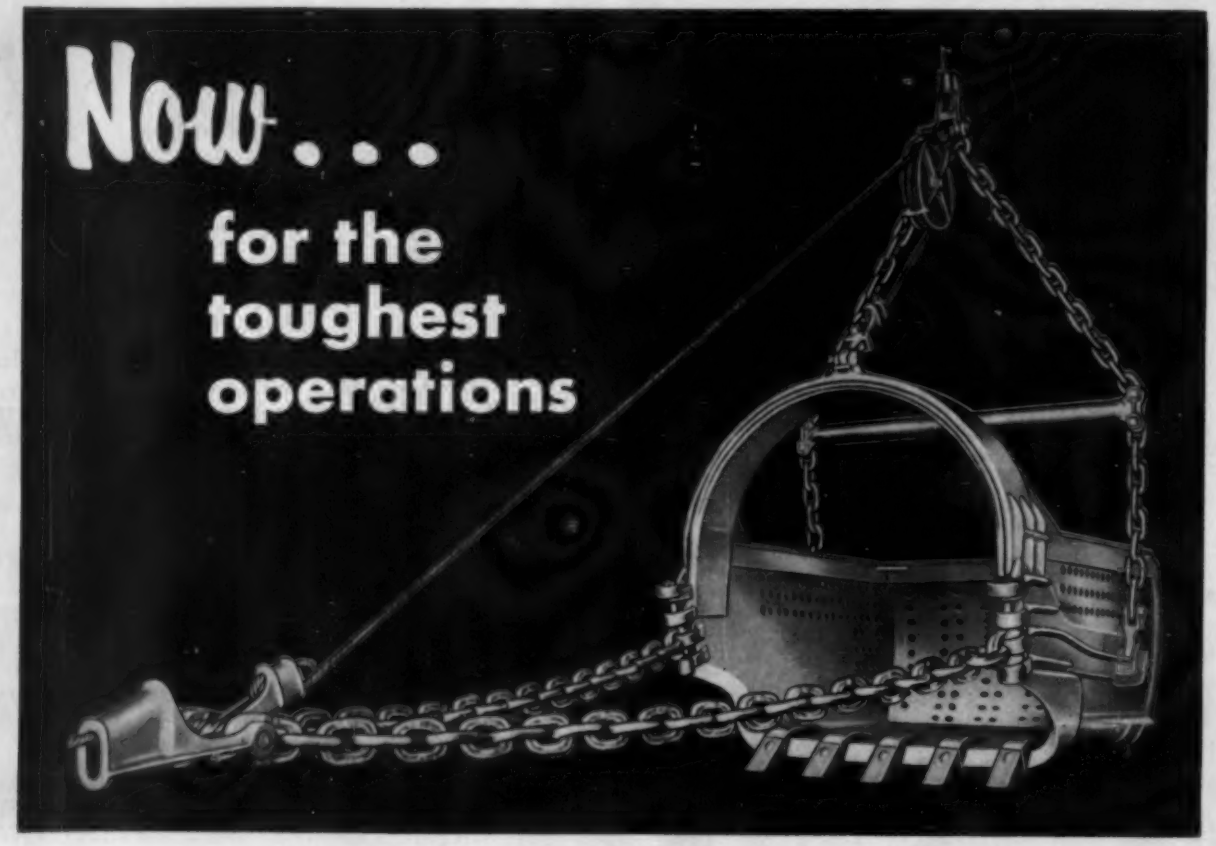
P&H ELECTRIC SHOVEL LINE: 3½ throug 8 cu. yd. capacities.

HARNISCHFEGER

CONSTRUCTION & MINING DIVISION
Milwaukee 46, Wisconsin

*T.M. of Harnischfeger Corporation for electro-magnetic type couplin

Now... for the toughest operations



the new "MH"

HENDRIX

Heavy Duty Mining Bucket

now there are...

4 TYPES

designed for every digging purpose

"LS"

"TS"

"HS"

and the new

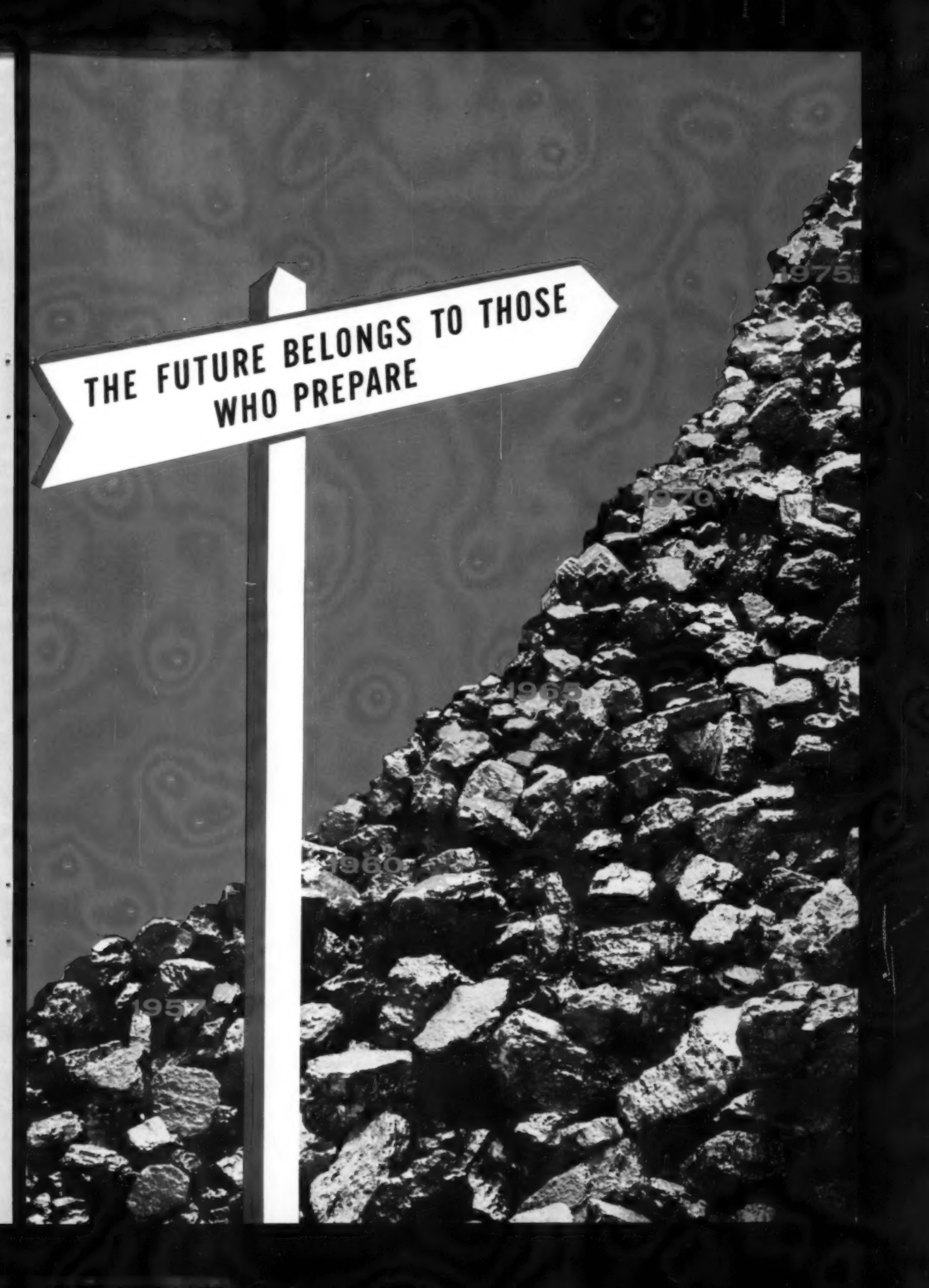
"MH"

Designed to meet the problem of rising stripping costs, the new Type "MH" Hendrix is engineered and built to take the abuse of the most rugged stripping conditions. Like all other Hendrix Buckets, the Type "MH" assures GREATER PRODUCTION at the lowest cost-per-yard for MORE PROFITS on every job.

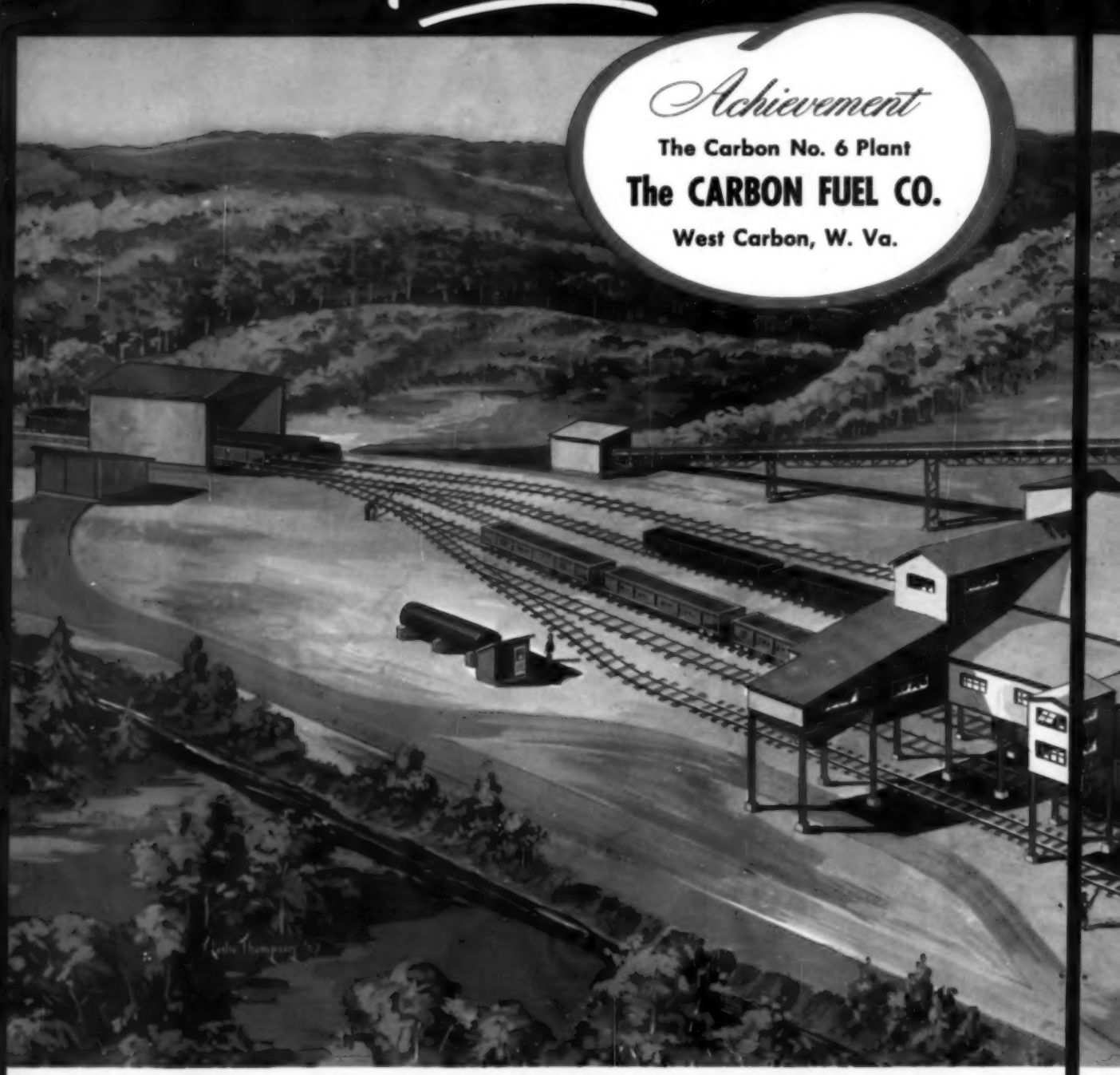
HENDRIX MANUFACTURING CO., Inc.

MANSFIELD, LOUISIANA

Hendrix Lightweight Dragline Buckets


THE FUTURE BELONGS TO THOSE
WHO PREPARE
1957
1960
1965
1970
1975

For *Know-how* Ask the



The Carbon No. 6 Mine of the Carbon Fuel Company at West Carbon, West Virginia, is geared to "manufacture" *fuel* from *coal*. It is set to compete for the better coal markets—and produce extra profits. It is handling this operation in the most efficient possible way—because this is a *complete* McNally Pittsburg installation.

Carbon Fuel's engineers, in collaboration with McNally Pittsburg's engineers, selected the McNally Tromp Dense Media Washer as that best suited to handle the coal cleaning problem—complete with adequate dryers—and a time-saving handling system. Result, The Carbon No. 6 Plant efficiently washes 6″ by 0 coals at 300 tph.

Men from McNally Pittsburg

Today, as never before, the future belongs to those who prepare. Farsighted management is insuring that future by checking with McNally Pittsburg—the men who know coal from the ground up.

McNally Pittsburg Mfg. Corp.

Gentlemen:

We need information on a complete new plant that

will wash_____inches by 0 at_____tons per hour and dry

_____inches by 0 at_____tons per hour.

Send information on the following special equipment:

Name_____ Title_____

Company_____

City and State_____

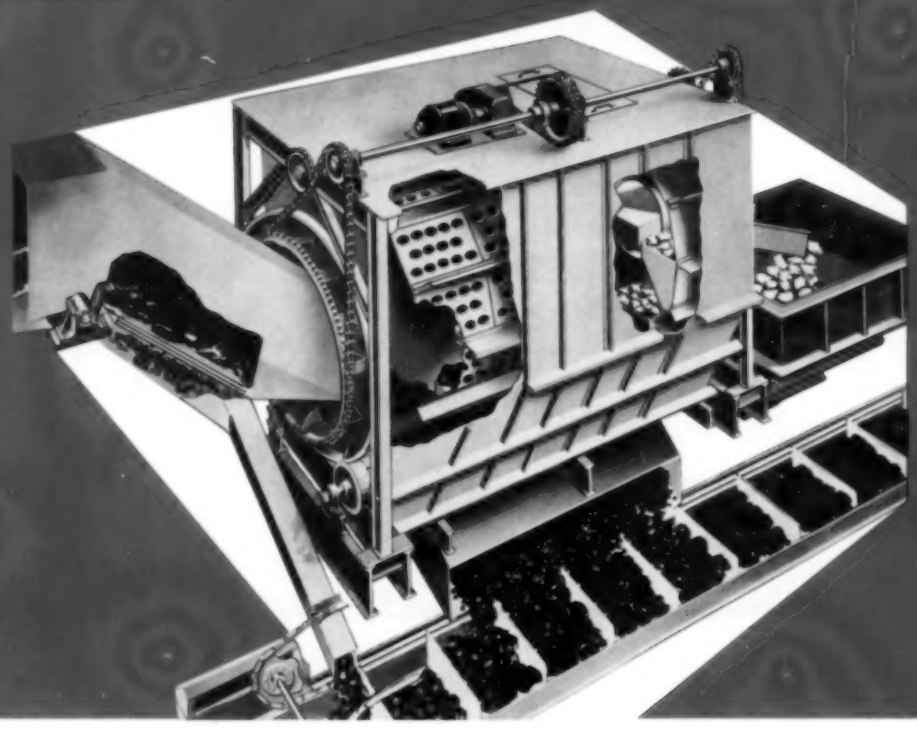
☐ Have Sales Engineer call for further consultation. C

The Same Experienced Engineering Builds

McNALLY PITTSBURG SPECIAL EQUIPMENT

Other McNally Equipment

- BACK STOPS
- BEARINGS
- BOOMS
- BREAKERS
- CAR DUMPS
- CASTINGS
- COAL CLEANERS
- CONVEYERS
- CRUSHERS
- DRYERS
- FEEDERS
- GEARS
- MACHINING
- PICKING TABLES
- PULLEYS
- SCREENS
- SPROCKETS
- TRANSMISSIONS
- VALVES



The McNALLY ROTARY BREAKER

The McNally Pittsburg Rotary Breaker is carried on four heavy-duty, antifriction bearing trunnions. Breaking plates are heavy-duty, cast-abrasion, shock-resistant steel. Corresponding heavy frame construction eliminates costly maintenance.

It is not necessary to provide preliminary inspection of run-of-mine feed for removal of rock, rail, and other foreign material that cause blockage in your present coal crushing equipment. Furthermore, if rock is extremely hard, it is removed from your run-of-mine at the discharge eye of the breaker, thereby lessening load on washing equipment.

Since all material must pass through the predetermined breaker plates which have equivalent round hole perforations cast in the plates, there is no more possibility of oversize reaching your preparation plant than there would be if round hole shaker screens were employed.

The stationary prescreen, plus the rotary screen action of the breaker, gives an immediate by-pass for the normal minus product existing in the feed. Near particle sizes are not subjected to further crushing action.

You Can Depend on McNally Pittsburg Equipment.

FIRST CLASS
PERMIT No. 93
(Sec. 34.9, P. L. & R.)
PITTSBURG, KANS.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

4c-POSTAGE WILL BE PAID BY—

McNally Pittsburg Mfg. Corp.

PITTSBURG, KANSAS

Ask the men who know coal from the ground up

McNALLY PITTSBURG
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

Built for Heavy Loads and Hard Knocks

This is a husky 10-ton car, a bulldog that will take a lot of beating. It was designed by Bethlehem, made in the Bethlehem shops—and every inch of it is sound.

Features include all-welded body, cast-steel trucks and roller bearings, forged-steel wheels and axles, automatic couplers, and spring draft gear. The car is intended for rotary-dump service.

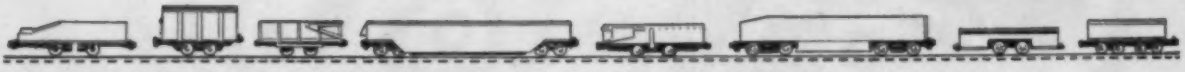
We recently delivered an entire fleet of units like this for a large-scale mining operation. The cars were designed, of course, to meet the requirements of that particular coal mine. Perhaps your own needs are altogether different; but whatever they are, Bethlehem is fully prepared to meet them with either end-dump or rotary-dump models. We can always give you a choice of welded or riveted construction, high- or low-side body styles, and four- or eight-wheel running gear.

Bethlehem engineers will gladly work closely with you on matters of car design and manufacture. When they can be of service, feel perfectly free to consult them. A letter or call will start the ball rolling.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



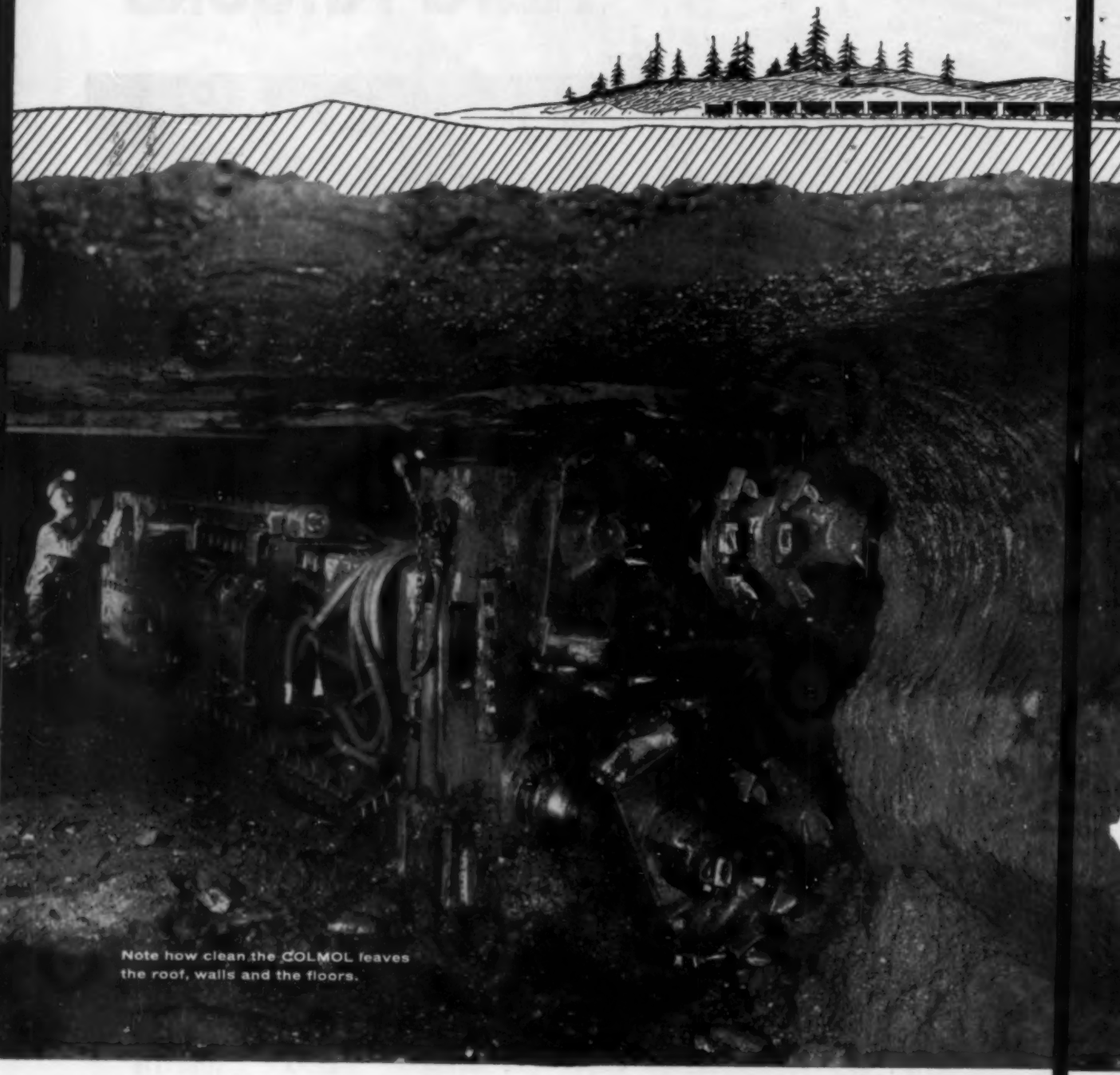
• As a powerful Jeffrey COLMOL Continuous charge conveyor swings 31 degrees for easy

PITTSBURG, KANSAS

Los Angeles • Pittsburg, Kansas • Wellston, Ohio

For high tonnage production...

the JEFFREY COLMOL®



Note how clean the COLMOL leaves the roof, walls and the floors.

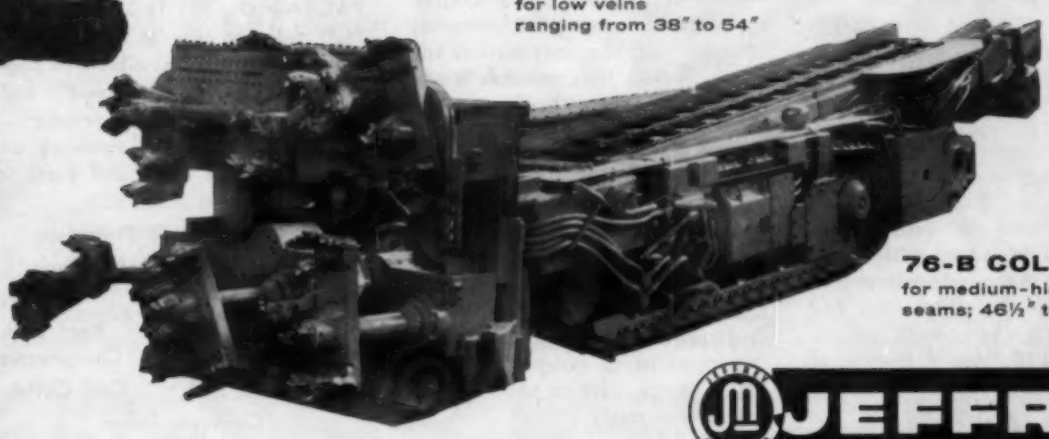
● As a powerful Jeffrey COLMOL Continuous Mining Machine advances into a seam, it brings down coal in an area 9′ 8″ wide times seam height . . . with little noise, vibration, or dust.

With head raised, lowered or tilted to follow seam irregularities, revolving cutters break off coal of a screen consist comparable in most seams to conventional mining. Arms sweep loose coal to the center for pick up by conveyor for discharge at rear. Discharge conveyor swings 31 degrees for easy loading. Hydraulic control assures instant and accurate adjustments.

Rugged construction cuts downtime. Operating parts are accessible for servicing and adjustment. Centralized controls once set, need little attention, thus reducing operator fatigue. Operator works in safety 20 feet from the face.

For data on a COLMOL write the Mining Division, The Jeffrey Manufacturing Company, Columbus 16, Ohio.

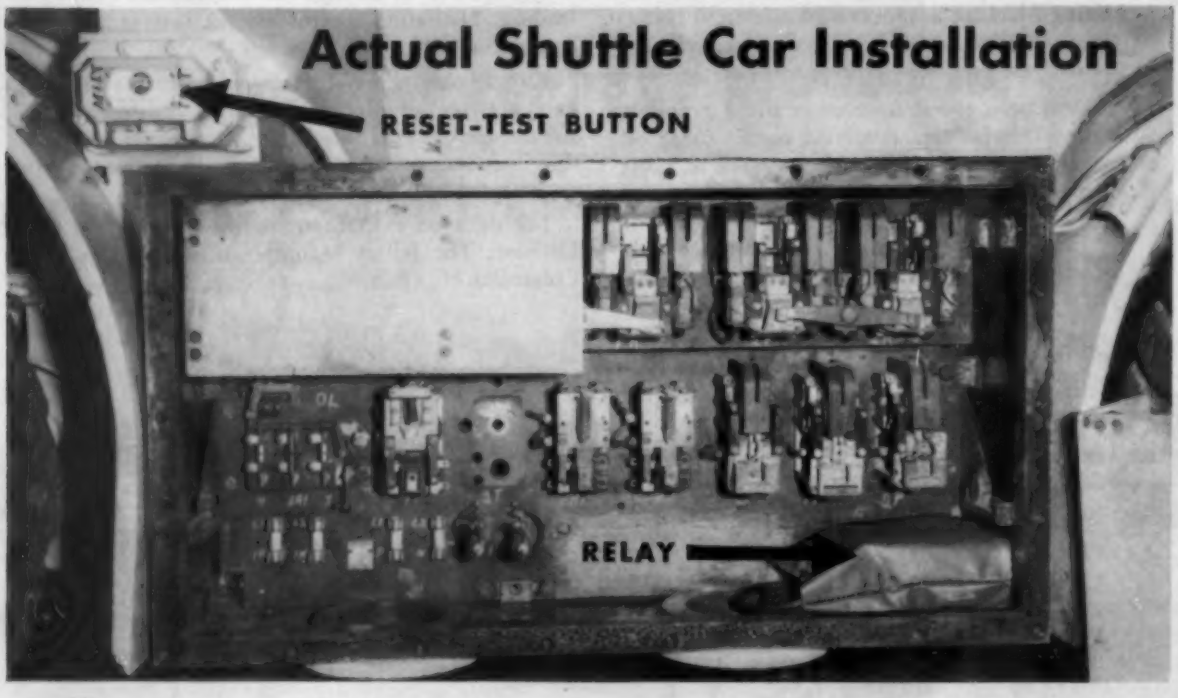
76-AM COLMOL
for low veins
ranging from 38″ to 54″



76-B COLMOL
for medium-high
seams; 46½″ to 72″

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT • TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

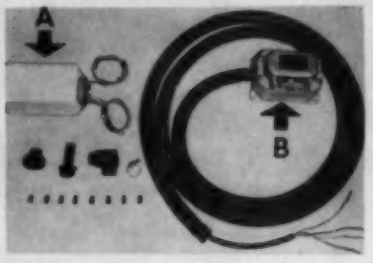


New A Low-Cost Ground Fault Detector YOU Can Install On Permissible Machinery

OUR NEWLY DEVELOPED "PROTECTO" ground fault detector is a compact, low-cost and easy-to-install device providing positive protection for men and machinery. It comes as a complete package, consisting of a pushbutton station for external mounting on the machine, a 5x3x8-in. relay unit approved by the USBM for mounting inside existing permissible-type controller compartments, cable and fittings.

In operation, the Protecto remains energized as long as the cable is hooked to the power line and in case of a power failure does not need resetting when power returns. In the event of a frame ground of 40 volts or more, the unit automatically locks itself out, preventing machine operation until the fault is cleared and the device reset. The pushbutton station in a USBM-approved explosion-proof container includes both the reset button and a test button that controls a test circuit permitting checking operation of the unit at any time.

Featuring a simple circuit and easily replaceable component parts, the Protecto can be readily adapted to operate on reversed polarity as well as regular. The low price of $159.50 for the complete package, ready to install, guarantees you full fault protection on most any mining machinery, except hand-held drills. Write, wire or phone us for full details today.



PACKAGED "PROTECTO" ground fault detector includes relay (A) for mounting inside permissible-type controller compartment, "Reset" and "Test" buttons in explosion-proof container (B) for external mounting on machine, plus cable and parts.

Positive Ground-Fault Protection For Your Permissible Machinery:

Continuous Miners	Loaders
Shuttle Cars	Roof Drills
Rockdusters	Compressors
Mobile Coal Drills	Coal Cutters
Conveyor Drives	

RED NECKTIE BRAND

CENTRAL MINE SUPPLY COMPANY DIVISION of

PICKARD INDUSTRIES, INC.

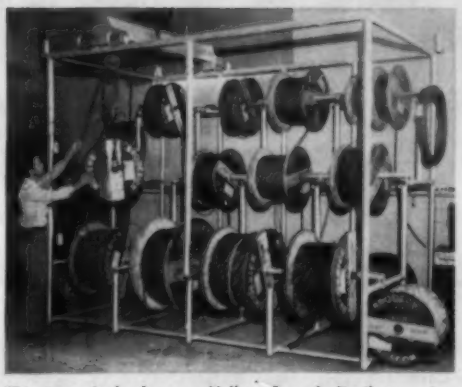
218-224 So. Third St., Mt. Vernon, Ill., Phone 2124

Reels Ready to Roll When You Need Wire Rope

Stocks on hand . . . that's good to know when you need wire rope. It assures steady production on your equipment when time counts most.

There are always adequate stocks of Yellow Strand Wire Rope in the right types and sizes — conveniently near you. Yellow Strand distributors and Broderick & Bascom Warehouses are strategically located throughout the U.S.A., always ready to serve you.

High quality Yellow Strand Wire Rope, resulting from more than 80 years manufacturing experience, means long wire rope life and lower costs. Take advantage of the extra service you get from Yellow Strand — and the money-saving feature of "stocks on hand." Write for name of nearest distributor.



This is typical of many Yellow Strand distributor wire rope stocks. You have it when you need it — at nearby stores or warehouses. Experienced counsel on wire rope application is also available at your distributors or from a Broderick & Bascom sales engineer. Ask for it today.

Yellow Strand®
Manufacturers of Wire Rope for over 80 Years

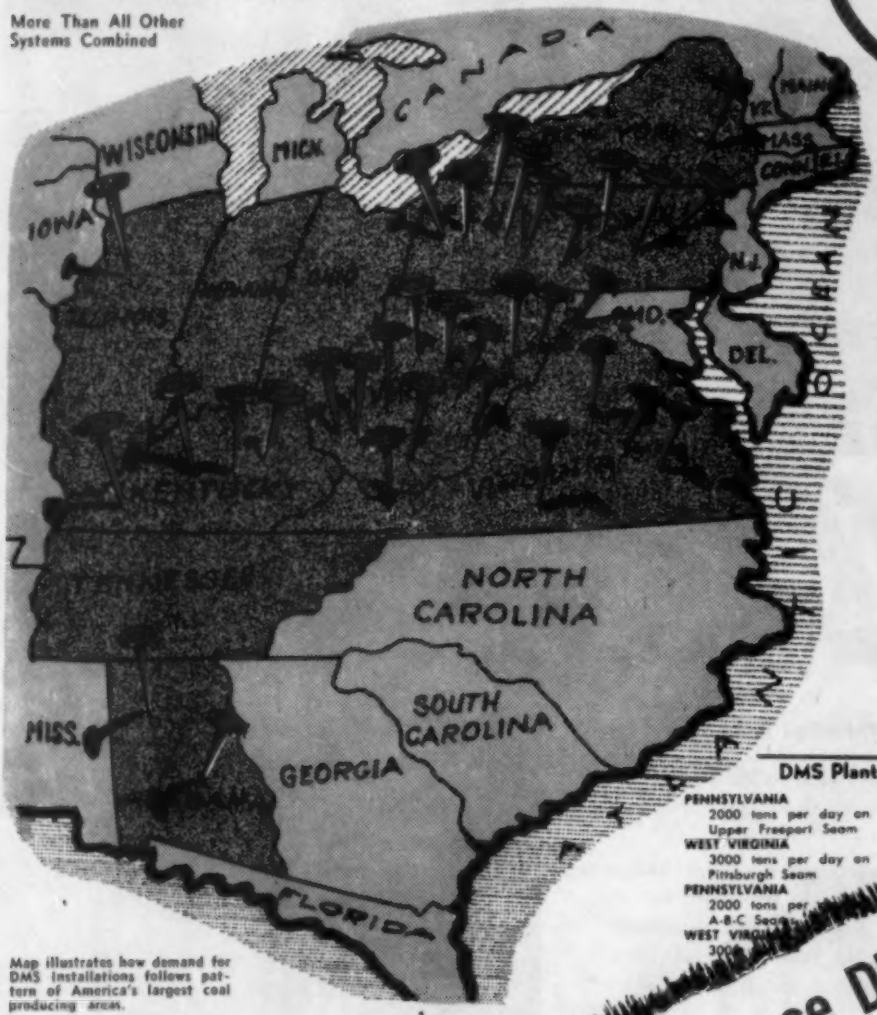
BRODERICK & BASCOM ROPE CO.
4203 Union Blvd., St. Louis 15, Mo.

COAL PREPARATION **NEWS**

Coal Fields Set Profit Records with DMS*

44 DMS INSTALLATIONS IN 3 YEARS

More Than All Other Systems Combined



Map illustrates how demand for DMS installations follows pattern of America's largest coal producing areas.

DMS is the only Coal Preparation System that can handle big tonnages and still operate at better than 99% efficiency. That's why so many leading coal producers are installing DMS Systems as the surest way to increase profits and production at the same time.

By meeting the requirements of producer and buyer alike, DMS presents a 'foolproof' System for big tonnage production of easy-to-sell coal. There's no involved procedure—an entire 'push-button' controlled Plant can be operated by one man. Specific gravity level is automatic. Simplified, practical design provides lowest preparation costs in the industry.

It's easy to see why DMS is America's 'blue chip' Preparation System when you learn that one installation alone is paying for itself every 2 months in extra profits.

DMS Plants In Order of Completion

PENNSYLVANIA
2000 tons per day on Upper Freeport Seam
WEST VIRGINIA
3000 tons per day on Pittsburgh Seam
PENNSYLVANIA
2000 tons per day on A-B-C Seams
WEST VIRGINIA
3000 tons per day on
EASTERN KENTUCKY
2000 tons per day on
ALABAMA
2400 tons per day of Iron Ore
EASTERN KENTUCKY
3000 tons per day on Harlan Seam
VIRGINIA
1000 tons per day of Manganese
VIRGINIA
2500 tons per day on Pocahontas No. 3 Seam
PENNSYLVANIA
1000 tons per day on A and D Seams
WEST VIRGINIA
2500 tons per day on Pocahontas No. 3 and No. 4 Seams
WEST VIRGINIA
2800 tons per day on Pocahontas No. 3 and No. 4 Seams
KENTUCKY
2000 tons per day on Crockett Seam

11 Of These DMS Installations In 1956 At 2950 t.p.h. Output

Write For Complete Performance Data—FREE. Find out how to increase your own profits—arrange for an inspection of the DMS Plant nearest you.

THE DANIELS COMPANY

22 North Fifth St.
Indiana, Penna.

BRANCHES
Newark, N. J.
Bluefield, W. Va.

*REG U.S. PAT. OFF. No 623396

Euclid tractors and scrapers

lower stripping costs for mines and quarries

Tremendous power, speed and maneuverability make the 436 h.p. Euclid TC-12 Twin-Power Crawler a top performer in heavy duty mine and quarry work. No other tractor matches it for low cost production in stripping overburden, clearing, stockpiling, building haul roads and other big tractor jobs.

Euclid scrapers have struck capacities from 7 to 24 cu. yds. with engines ranging from 143 to 518 h.p. The complete line, including both two axle and three axle models, has hydraulic lever action that eliminates down-time caused by cable breakage. Good maneuverability and fast travel speed reduce cycle time . . . help move more loads and more yards for lower cost stripping operations.

Check the many advantages of "Eucs" for your operation . . . have a Euclid dealer show you why ***Euclids are your best investment.***

•

EUCLID DIVISION, GENERAL MOTORS CORP., Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

At Bradford Hills Quarry, Downingtown, Pa., equipment of Lukens "T-1" steel of 321 min. Brinell hardness now handles 1000 tons of limestone daily—so far has lasted more than 18 times as long as metals previously used for the same purpose.

Lukens "T-1" Steel outlasts previous metals 18 to 1

TRADEMARK

Maintenance and replacement costs dropped sharply in chute liners, impact crusher caps, and similar parts when Bradford Hills Quarry switched to Lukens "T-1" steel. These critical parts once wore out in a month. Now they show little or no wear *after 18 months.*

Whether you handle stone, coal, or metal ores, Lukens "T-1" steel in areas hardest hit by punishing impact and abrasion will save you money too. Wear plates, dredge pump liners, storage bins, and fly-ash collectors are just a few typical applications.

Lukens "T-1" steel retains its remarkable combination of hardness and toughness at temperatures well below zero. *Look into it now. Write for informative illustrated booklet, "Lukens 'T-1' Steel." Address Manager, Marketing Service, Room 902, Lukens Steel Company, Coatesville, Pennsylvania.*

LUKENS ®

Helping industry choose steels that fit the job

The single-motor design of the new National Mine TORKAR* A.C. or D.C. shuttle car is a major factor in reducing maintenance and operating costs

Electrical controls and wiring are greatly simplified because one, *single*, large capacity, non-reversing, A.C. or D.C. motor supplies all power for the new TorKar.

Driving through a torque converter, the motor operates at its most efficient speed, with less frequent starts and stops, and for much of the time under less than its full-load capacity. Ample opportunity is afforded for dissipation of heat. Power demand is less, and longer service life and lower maintenance cost are assured.

The torque converter absorbs and minimizes torsional shock of the drive line to the motor, and multiplies motor torque in varying amounts to meet demand. It also prevents the motor from being overloaded to the point where it might approach a stalled condition, thus inviting thermal damage.

Further reduction of load demand on the motor is accomplished by the constant-mesh, three-speed forward and reverse, patented transmission which makes it possible easily and quickly to select a gear ratio which will allow continuous movement of the car without jogging the motor or pulling its speed down to a point where it would operate inefficiently.

To learn in more detail how the TorKar can cut your maintenance and operating costs with these and other exclusive engineering and design features, write for literature or ask your National Mine representative to call.

*Trademark

U. S. Bureau of Mines Approved

National Mine Service Company

564 Alcoa Building • Pittsburgh 19, Pennsylvania

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Kentucky-Virginia Division, Jenkins, Ky. — Western Kentucky Division, Madisonville, Ky. — Whiteman Division, Indiana, Pa. Morgantown, W. Va.

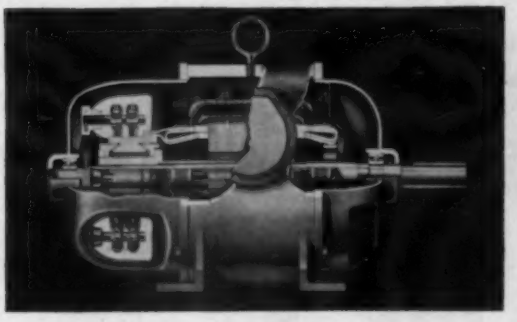
No place for motor failure!

Westinghouse motors assure continuous output of 3 conveyors averaging 600 tons in 16 hours

At Omar Mining Company, Westinghouse SK motors drive each of three conveyor units built by The Long Company. Dependable motor operation assures a constant stream of coal.

More than a hundred electric motors, ranging from 5 hp to 150 hp, are used at Omar's No. 15 mine . . . and in most cases they're Westinghouse because of proved performance in getting out the tonnage.

You can bring improved reliability to your operations by getting more facts about the complete line of Westinghouse SK motors, both standard and special. Contact your Westinghouse representative today. J-21967-X



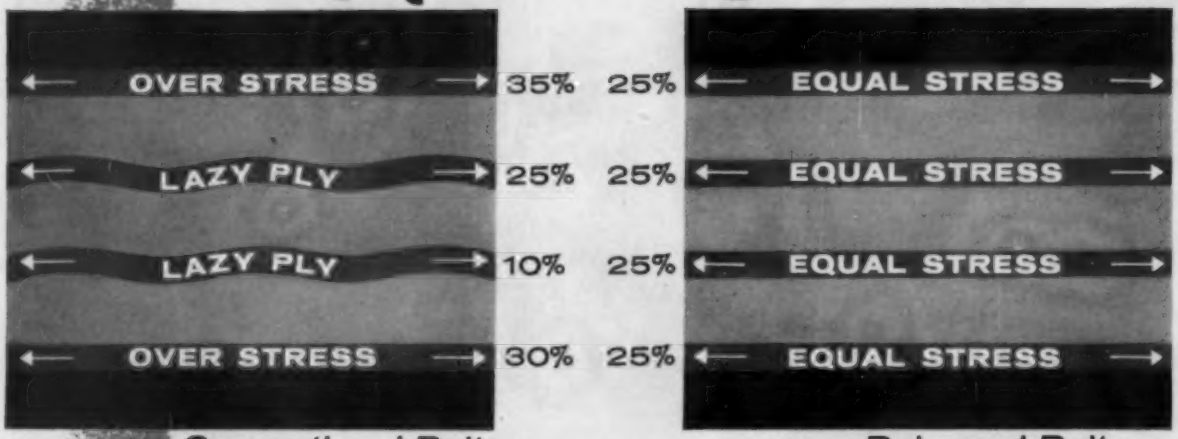
Dependable Westinghouse SK motors help reduce costly down time because sealed bearings need no lubrication; armature and commutator construction assures maximum electrical stamina; controlled ventilation prevents local heating.

Each conveyor operates alternately from one area to another; is driven by a Westinghouse 25-hp, 250-volt, d-c motor. Planned movement of coal depends upon reliability of motors subjected to heavy loads and adverse operation conditions.

YOU CAN BE SURE...IF IT'S

Westinghouse

Are you paying for "lazy plies" in your belts?



Conventional Belt Construction

Balanced Belt Construction

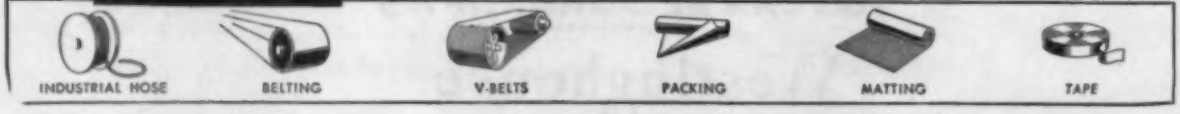
Balanced Belt Construction

Equalizes stress – prolongs belt life

BBC – Balanced Belt Construction – equalizes ply stress . . . *every* ply pulls its share of the load. You get trouble-free service . . . greater economy. BBC is a result of two remarkable BOSTON developments: *Electro-Tensile Control* and *Rotocure*. Electro-Tensile Control electronically controls stress in the plies during manufacture. Rotocure, the only continuous method of vulcanization, assures complete uniformity from end to end.

You cannot afford to underestimate the value and importance of Balanced Belt Construction. Your BOSTON man is ready to demonstrate how BBC prolongs belt life, minimizes downtime, saves you money!

BOSTON BOSTON WOVEN HOSE & RUBBER CO. BOSTON 3, MASSACHUSETTS



REDUCE THE MOISTURE CONTENT of Your Coal

from 35%

to 7%

to 6%

to 5%

Yes, even less

Remarkable performance records over the years prove that C.M.I. continuous centrifugal dryers cannot be beat.

C.M.I. Dryers not only reduce surface moisture content from 35% to *less than 5%*, but also will do a fine job in recovering coal from slurry.

Yes, C.M.I. Coal Dryers and efficient coal mining operations go together. Our engineers are available to render prompt service, whenever and wherever needed.

Write, wire or phone for complete details. No obligation.

with C·M·I CONTINUOUS CENTRIFUGAL coal dryers

C·M·I Centrifugal DRYERS

CENTRIFUGAL & MECHANICAL INDUSTRIES, INC.

146 PRESIDENT STREET • SAINT LOUIS 18, MISSOURI

Over-specialized equipment hiking costs?

READ HOW ANACONDA handles all material fast with Michigan Tractor Shovels

Most ore mined by the world-famed Anaconda Company at Butte, Montana, is smelted by the Anaconda Reduction Works in nearby Anaconda. From a pioneer beginning, nearly 75 years ago, this smelter has grown to be one of the largest in the world. This growth reflects Anaconda's unceasing search for a *better* way at *lower* cost in *less* time. Typical was their recent shift from slow single-purpose handling equipment to two highly mobile Michigan Tractor Shovels.

Transports material weighing 5,400 lbs per cu yd

These rugged versatile 2¾ yard Model 175A's "run" at 27 mph speeds all around the big plant to handle a wide variety of loading tasks. Hard-to-handle chunks of ferro-manganese—*weighing 200 pounds per cubic foot*—are the heaviest tractor-shovel work on hand.

One of the Michigans usually does the entire job. In a few hours it moves weekly requirements of 100 tons 750 feet from plant stockpile to massive timber storage platform. Planetary wheel drive axles, torque converter take up shocks of this rugged work.

Outworks a crane— with half the manpower

Planetary axles and the efficient all-Clark power train help out on another tough job—truck-loading "purification cake"—a sludge from the smelting process, rich in metals such as gold and silver. With a crane, it used to take 12 hours (and a 2-man crew) to load 240 tons; one Michigan now does the *same* job in *six* hours—with only one man! Operators like the fast reverse and power-shifting of the Michigan . . . management is pleased with the time and labor saved.

Goes in to load where trucks don't dare

Millions of cubic feet of calcine—iron oxide powder—are stockpiled here; it's used to make sponge iron for

treating copper ore in the flotation process. But on the ground it's a mountain of soft, treacherous dust. Trucks sink deep into the soft footing, so the big-tire four-wheel-drive Michigans go in alone, rush heaping buckets back out. A single Michigan keeps three five-yard trucks busy on a half-mile haul, heaps up to 80 truck loads in a day!

In 8 hours, digs 80 foot trench through rocky soil

Despite busy schedules moving various stockpiled materials, the Michigans find time to do lots of odd jobs, too. Here, a Michigan digs its way through sun-baked earth and rock, excavating the trench for a concrete tunnel to hold electrical conduit. The trench is eight feet deep, ten feet wide, 80 feet long. How long did it take? *Only one 8-hour day*—and this includes piling waste material 100 feet away! The secret is a *full bucket* loaded and delivered every pass, a "trademark" of all Michigans. Unexcelled breakout force, low-level-tipback and low-level-carry also help deliver those bigger loads.

Spots and loads 12 rail cars in 5 hours

Anaconda's two Michigan 175A's spend roughly 30% of their time loading stockpiled crushed limestone. They move empty rail cars into position at the quarry, then fill them up. Loads run about 60 tons per car; each Michigan can fill a dozen cars in only five hours! Off-time jobs include stripping dirt; cleaning haul roads and around conveyors; helping trucks up steep grades; and removing tons of ash from the flue of the smelter stack.

Which of these will fill the bill for you?

Model 12B:
6, 10, 16 (std), 20 or 27 cubic *foot* buckets
Models 75A, 75B, 75R:
¾, 1¼ (std), or 1½ *yard* buckets
Model 125A:
2 (std), or 2¾ *yard* buckets
Model 175A:
1⅜, 2, 2¾ (std), 3 or 5 *yard* buckets
Model 275A:
4 *yard* (std) bucket
Model 375A:
6 *yard* (std) bucket

For help in determining which of these eight models and how many of their 37 different buckets and attachments, will do an Anaconda-class job for you, let one of our Job Study Engineers study your layout. A card or a call will bring him. No obligation, of course—but we believe you'll find his suggestions worth further study!

CLARK® EQUIPMENT

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2473 Pipestone Road
Benton Harbor 15, Michigan

Loaded and ready — with less hazard from stray currents

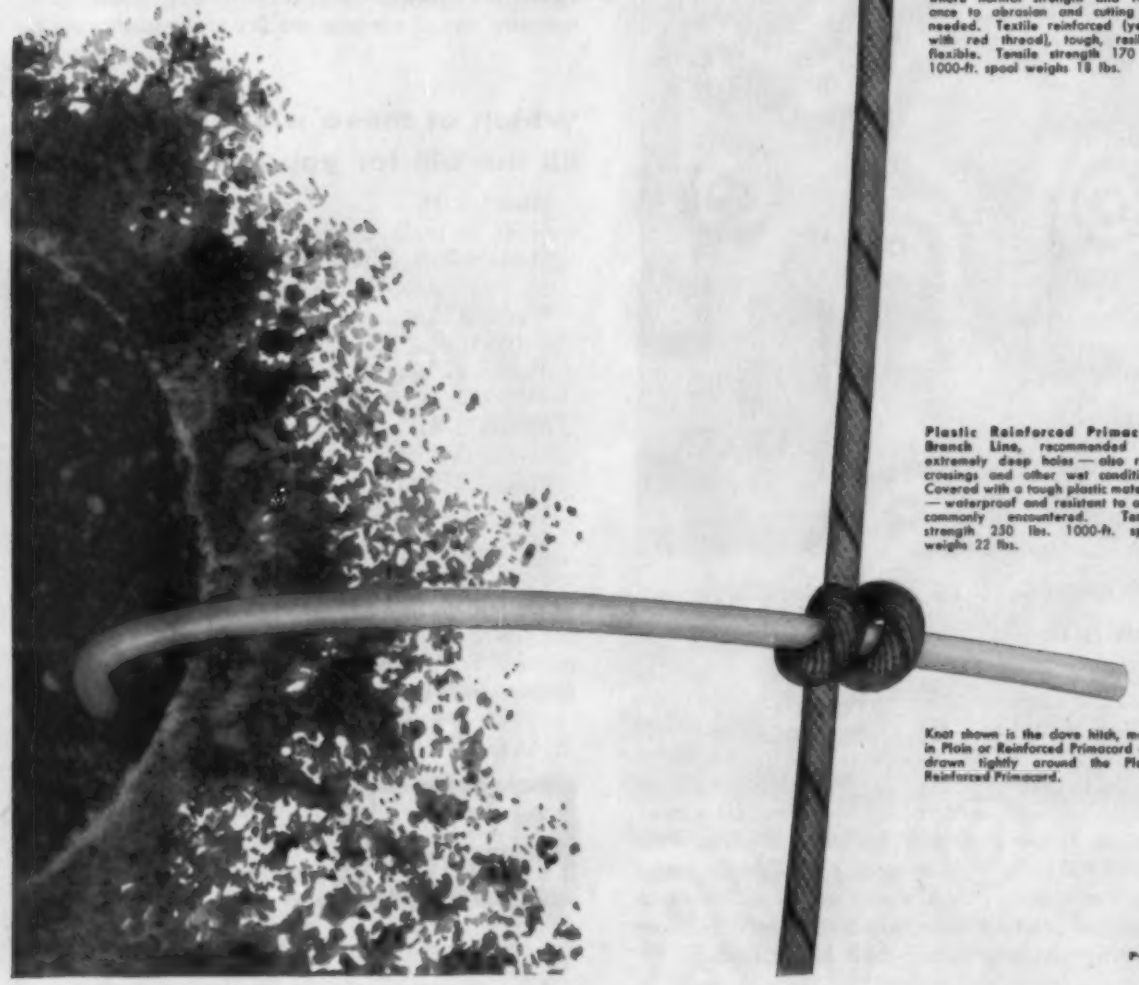
PRIMACORD®
DETONATING FUSE

This hole is loaded and ready to go — *but only when you say the word.* All danger of a premature shot is reduced to the minimum, because the detonating agent is Primacord. It cannot be set off by fire, friction or ordinary shock, but must be detonated. It is not affected by stray electrical currents, and even a direct hit by lightning failed to detonate it.

THE ENSIGN - BICKFORD COMPANY

Simsbury, Connecticut • Since 1836

Primacord® Detonating Fuse, Ignitacord®, Quarrycord, Safety Fuse, Pyrotechnical Devices and Blasting Accessories



Reinforced Primacord Trunk Line — also recommended for deep holes where normal strength and resistance to abrasion and cutting are needed. Textile reinforced (yellow with red thread), tough, resilient, flexible. Tensile strength 170 lbs. 1000-ft. spool weighs 18 lbs.

Plastic Reinforced Primacord Branch Line, recommended for extremely deep holes — also river crossings and other wet conditions. Covered with a tough plastic material — waterproof and resistant to acids commonly encountered. Tensile strength 230 lbs. 1000-ft. spool weighs 22 lbs.

Knot shown is the clove hitch, made in Plain or Reinforced Primacord and drawn tightly around the Plastic Reinforced Primacord.

P-3

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

FEBRUARY, 1957

IVAN A. GIVEN, EDITOR

More and Better

BY ALL THE STANDARDS—with one exception—the year 1956 in the coal industry was one of real progress, thereby laying the foundation for further gains in 1957 and the years beyond. The exception was safety, where the record was but little improved over 1955, even though major advances were marked up by many individual organizations. But coal has marked time before in safety and then has gone on to new records, so there is every reason to expect it to repeat in 1957, in which year, and others to follow, 1956 advances in raising efficiency, upping product quality and improving marketing methods will pay off in higher tonnage and a better return.

More Tons per Man . . .

The 1956 story in production efficiency was not only one of higher-capacity equipment, whether continuous miners or stripping units, but equally or more important one of stress on the auxiliary services that affect the efficiency of the main operation. Extensible belts and bridge units behind miners underground and new higher-capacity drills in stripping are among the outstanding examples. But operators, designers and builders covered more ground than that. For example, at least two mining companies took steps toward solving the problem of acid mine drainage. A sizeable increase in tons per man was evidence that this expenditure of money and brains paid off in 1956 and will continue to pay off in the future.

Quality Stepped Up . . .

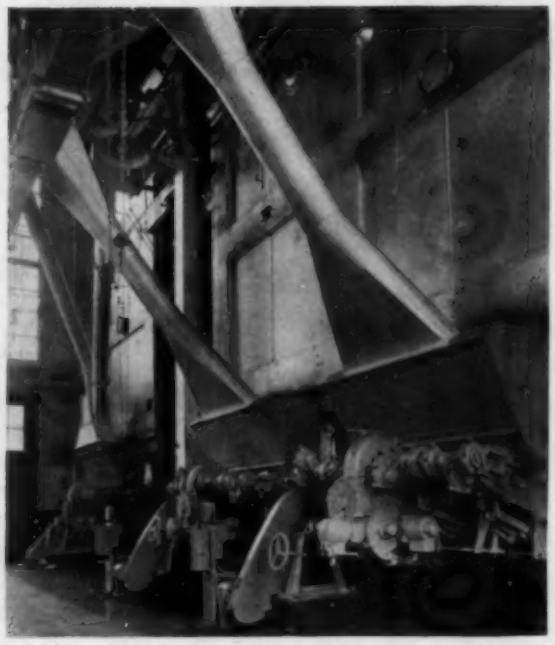
As with production, the big advance in coal preparation in 1956 was in auxiliary operations designed to reinforce and point up the basic benefits of impurity reduction, accurate sizing and uniformity of shipments. Thus, more facilities for cleaning and drying fines and for clarifying and treating wash water were supplemented by such auxiliaries as storage facilities for both raw and prepared coal and other measures for improving plant operation and preparation results. Operation with minimum manpower was again stressed in 1956, along with cutting plant maintenance costs.

Marketing Sharpened . . .

Cost and quality achievements yield the maximum in marketing benefits only when accompanied by hard-hitting merchandising practices backed up by fundamental and applied research and by readily available and reliable service on coal-utilization problems. One of the highlights of 1956 was the progress of both the anthracite and bituminous industries in these directions. Backing up these advances was continued enhancement of marketing power through mergers, through combining more tonnage in single sales agencies, and through the maintenance of peaceful relations between management and men.

For a Bigger Future

The long list of solid gains in 1956, however, does not mean that problems have been completely dissipated. Anything but. As examples, coal must still contend with the questions of an adequate supply of skilled manpower, money for new equipment and expansion, subsidized or government-encouraged competition, mine-to-market transportation costs, including to overseas points, depletion rates and pollution control, among others. But a rising sales curve eases any problem, and that is the outstanding aspect of the coal future—a future in which the rewards of problem solving will be bigger and better than ever.

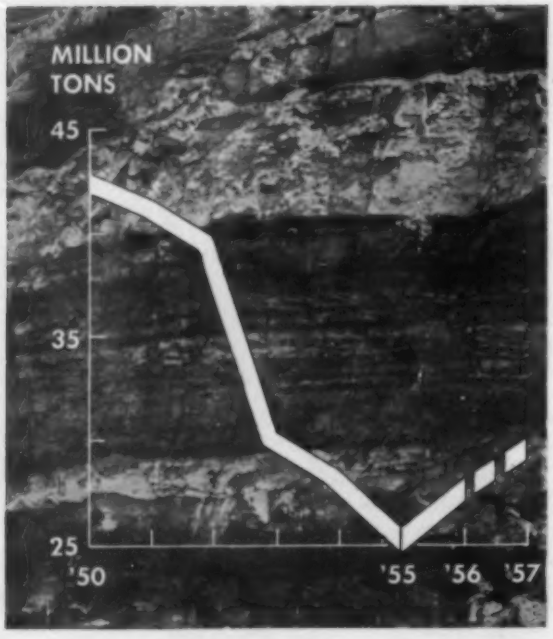


BITUMINOUS
. . . Builds for 1960

Management cites faster, higher capacity underground haulage as top need for stepping up output per man—a vital link in 5-yr $1.5-billion mine development plans.

. . . Attacks Competition

Industry organizes through Bituminous Coal Institute to minimize losses to competitive fuels; develop new business; convert plants to modern coal equipment.



Action in '56

ANTHRACITE . . .
Reverses Production Decline

For the first time in 6 yr, commercial output (excluding colliery fuel) increases—from 25.7 million tons in '55 to 28.1 million tons in '56. First wage hike in 4 yr reflects improved industry state. Companies see continued recovery ahead based on strong demand in home, commercial and export markets and on expanding sales of automatic equipment.

. . . Promotes Export

Producers, brokers, UMWA and rail carriers unite through American Coal Shipping, Inc., to hold ocean freight costs down; develop full overseas potentials for coal.

. . . Secures Labor Peace

UMWA and producers agree on second peaceful wage boost in 2 yr; set stage for orderly expansion of production facilities and improvement of marketing methods.

. . . Spur to Progress in '57

ACTIONS VITAL to clinching a bright future took the bituminous spotlight in 1956 and laid the basis for progress in 1957. Increased anthracite output, reversing a 6-yr production decline, gave hard-coal companies their first tangible promise of better years to come. As pictured above, those features of the coal year meant, for bituminous:

• Planning a 5-yr $1.5-billion expansion and improvement program to meet a probable 1960 market of 610 million tons, up from estimated 1956 tonnage of 500 to 505 million tons.

• Establishing Bituminous Coal Institute to spearhead a total attack on competitive fuels through harder-hitting merchandising methods.

• Setting up American Coal Shipping, Inc., to protect and develop a long-range, bulging export market.

• Strengthening the labor front through negotiating the second peaceful wage hike in two years.

For anthracite, the big fact in 1956 was resurgence. Annual output has dropped steadily from 1950 to 1955. The past year saw commercial production jump 9%, or 2,300,000 tons to 28,100,000 tons. Resurgence also meant the first wage boost for anthracite miners in 4 yr.

Anthracite leaders looked for the upward production trend to continue in 1957 and later years. Their optimism was largely based on the growing export market, rising prices for competitive fuels and expanding sales of automatic burning equipment.

Among the bituminous markets in 1956:

• Sales to export, electric utility and industrial markets showed the biggest gains over 1955, with no let-up indicated in their momentum during the coming year.

• The 5-wk steel strike brought a slight setback of 2 million tons in coal use by that industry for the production of steel and by-product chemicals, but unprecedented expansion in steel capacity promises 1957 recovery.

• Although retail sales fell off one million tons, sentiment increased that this market should level off in the

years ahead and perhaps show some upward trend.

• Railroad purchases dropped another 3 million tons. Continued decline here seems inevitable unless the BCR gas turbine locomotive—scheduled to go into a production model this year—bears out the promise of progress reports.

A third-quarter NCA tonnage roundup (*right*) puts total bituminous output at 532 million tons in 1957, indicating a probable increase of 23 million tons, or 4% over 1956. Revised estimates show that 1956 output will hit 500 to 505 million tons, with percentage and tonnage increases for 1957 remaining about the same. These increases jibe broadly with forecasts for continued growth in the Nation's economy.

The Federal Reserve Board, for example, estimates that industrial activity in 1957 will be 3% above 1956. McGraw-Hill's Department of Economics expects a 5% increase in the physical volume of new plants and equipment. Higher tonnage will also be firmed up by the insatiable thirst of overseas countries for U. S. coal.

But the prosperity ahead is not without its problems. In addition to planning for new capacity and pushing for lower-cost production, coal must also face the ominous spectre of rising freight rates (p 62), a still serious car shortage (p 62), legislative battles (p 62), and the changing competitive picture treated on this and following pages.

Anthracite Resurgent

THE '56 RECORD: Tangible Promise of Prosperity

For the first time since 1950, anthracite production showed an increase over the preceding year and gave tangible promise of better years to come. Total commercial output (excluding colliery fuel) reached an estimated 28,100,000 tons in 1956—2,300,000 tons or about 9% more than in 1955.

Factors behind the resurgence of anthracite last year, as seen by Francis O. Case, president, Glen Alden Corp., include:

1. The disposition of heavy inventories of coal that resulted from overproduction and helped disrupt the market for several years.

2. Improvements in the industry-wide allocation plan for keeping production geared to market demands.

3. More stable pricing throughout the industry.

NCA Tonnage Roundup: Bituminous in '56 and '57

	Millions of Tons	
	1956	1957
Electric utilities	157.0	170.0
Coke ovens and beehive	107.0	110.0
Steel and rolling mills	5.0	5.0
Railway fuel	12.0	9.0
Cement mills	9.6	11.0
Other industrials	98.0	101.0
Retail	54.0	52.0
TOTAL U. S. CONSUMPTION	442.6	458.0
Canada	19.0	19.0
Overseas	48.0	55.0
PRODUCTION (consumption and exports)	509.6	532.0

4. An improvement in export business, brought on primarily by heavily increasing demands from Western Europe.

5. Higher prices for competitive fuels owing in part to such developments as the closing of the Suez Canal with its curtailing effect on oil shipments.

Reflecting the improved state of the industry, anthracite miners received their first general pay increase in 4 yr. Under a new UMWA contract, effective Dec. 1, 1956, wages jumped $2 per day for those directly involved in mining coal and $1.50 per day for others. Vacation pay was also increased from $100 to $140 a year for mine workers employed during each of the 24 annual pay periods.

The wage boost caused some producers to advance the price of rice coal and larger sizes from $1 to $1.25. Despite such advances, retailers seemed undisturbed. They say that their prices are about the same or, in some cases, lower than those listed in 1952 after the last wage hike.

Looking ahead, industry leaders see further gains for anthracite in 1957. Their optimism is based on strong demand for anthracite in the home, commercial and export markets, as well as on expanding sales of automatic anthracite burning equipment. The record shows that sales of this new equipment, running 250% ahead of 1953 sales, have increased for 27 consecutive months.

Exports, including to Canada, reached about 4,900,000 tons in 1956 and are expected to continue as a firm bulwark to sales. Overseas shipments last year—mainly to the Netherlands, France, Italy, Belgium and Luxembourg—totaled about 2,500,000 tons, more than triple those in 1955.

Greater actual or potential use for anthracite in industry was highlighted in 1956 by these developments:

1. About 390,000 tons of anthracite was used as a blend with bituminous in the manufacture of coke, compared to 365,000 tons in 1955 and 230,000 tons in 1954.

2. The Philadelphia & Reading Corp. expected to put its new 500-tpd fine-coal recovery plant at St. Nicholas, Pa., in full production by the end of December, 1956. Construction of the plant, P. & R. stated, reflected confidence in the permanency of the new market for anthrafines in sintering taconite and other low-grade iron ores.

3. The Philadelphia & Reading Corp. also announced that it would scale up its pilot operations for making synthesis gas and hydrogen by gasifying anthracite silt. Scaling up meant the building of a large semi-commercial plant near the Trenton (N. J.) labs of Hydrocarbon Research, Inc., which will design and build the plant and supervise operations. Cost of the project is put at $500,000. P. & R. says that the plant—due "on stream" in March or April, 1957—is the biggest research venture ever undertaken by an anthracite company.

4. The USBM reported highly promising research results on the use of anthracite coke as a direct charge in the blast furnace at the AIME Blast Furnace, Coke Oven and Raw Materials Conference, Cincinnati, Ohio, April, 1956. Russell C. Buehl and Miles R. Royer, USBM, said: "Anthracite has been satisfactorily substituted for coke for up to 40% of the fuel requirement with Mesabi ore and up to 60% of the fuel with prepared ores" (*Coal Age*, May, 1956, p 60).

5. The Commonwealth of Pennsylvania formed the Coal Research Board and gave it $500,000 to study ways of increasing anthracite and bituminous markets through developing new and improved uses.

Bituminous Vs. Competition

OUTLOOK: Gas Stiffer; Opportunity in Oil

A stiffer battle from natural gas and a mild easing in the battle against oil generally characterized the bituminous and anthracite competitive pictures in 1956. In all probability, this pattern will follow through the current year.

During the 12-mo period ending

October 31, 1956, natural gas sales hit a new peak of 68.3 billion therms, up 9.7% over the corresponding 1954-55 period. And the climb in demand shows no immediate signs of abating.

For the first time in gas industry history, sales during the month of October, 1956, exceeded 5 billion therms, a 13% increase over the comparable 1955 figure. The jump was primarily attributed by the American Gas Association to an increase of about 1.1 million customers since October, 1955. Coal management should also take particular heed of this fact: gas sales to industry were 7.1% higher in October, 1956, than in October, 1955, while industrial production, according to the Federal Reserve Board index, was up only 1.4%.

Although there has been much talk of dwindling U. S. gas reserves in recent years, the gas industry is making substantial gains in circumventing this problem by pushing its import program.

Highlighting this effort in 1956, the Federal Power Commission in October authorized the Texas Eastern Transmission Corp. to import up to 200,000,000 cu ft of natural gas per day from Mexico. Much of this is said to be destined for New England markets. The authorization overruled the objections of coal and other opposition forces for outright dismissal of the plan; it also denied a compromise effort to restrict imports to 117,303,000 cu ft per day—the recommended level based on proven gas reserves.

Some observers felt the FPC's favorable decision on imports from Mexico may be a forewarning of future conclusions on the proposal to pipe vast quantities of gas into Midwestern and Eastern markets from the trans-Canadian line authorized for construction last year by the Canadian legislature. Whether or not this alleged forewarning bears out in fact will depend greatly on how well and how solidly coal organizes in 1957 to fight the gas import program.

Total oil demand in 1956 was headed for a new peak of 3,167 million bbl, up about 3% over 1955. But the impact of record oil demand on coal was lessened because it was accompanied by (1) the third-quarter Suez crisis and (2) by a continued rise in oil prices, the latest of which came in January when the price of crude rose 35c a barrel from $2.90 to $3.25.

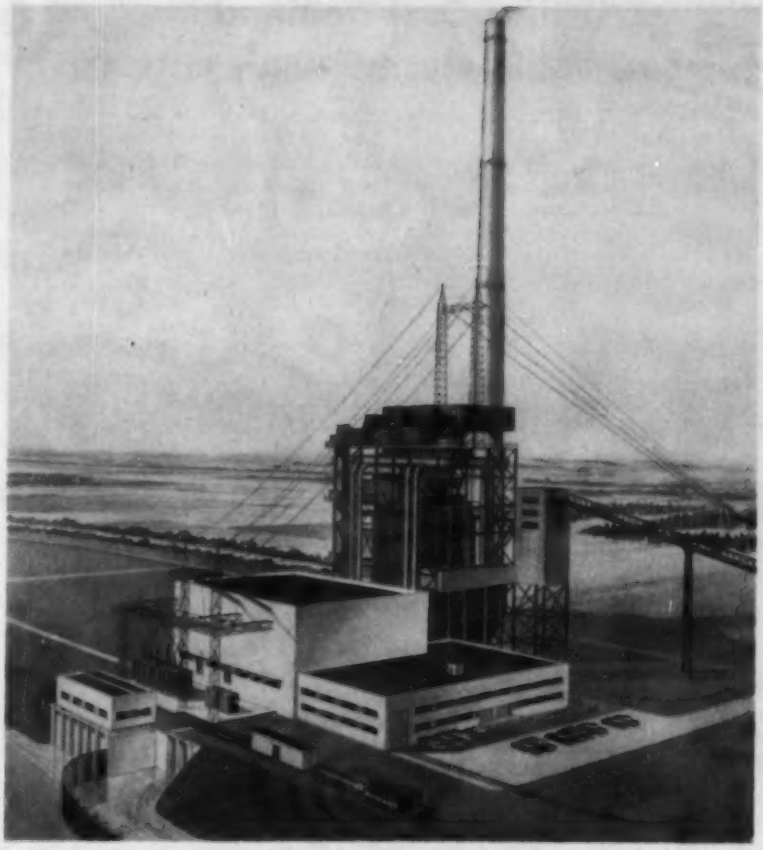
In its wake, the Suez crisis caused a mass diversion of residual and other oil imports to Europe, thus easing one of coal's principal competitive headaches. Previous to the Suez crisis, residual oil imports were running about 7% higher than in 1955 and ODM Director Arthur S. Flemming was on the verge of imposing restrictions since oil importers had failed to heed his pleas for voluntary policing.

Although coal will have the benefit of lower residual oil imports—at least during the first half of 1957—now is no time for the industry to let down its guard.

In the first place, chances are the diversion of oil imports to Europe because of the Suez crisis will only be temporary. And the oil industry, with its highly-geared sales-engineering and promotion programs, can be expected to redouble its efforts to hold customers.

In the second place, the Suez crisis on top of rising oil prices provides bituminous and anthracite with a unique opportunity to accelerate their attack on the retail and industrial markets where oil offers its stiffest competition. Fortunately, the machinery for expediting this attack is now available to bituminous through Bituminous Coal Institute (*Coal Age*, January, 1957, p 54); it has been available to anthracite for some years through the Anthracite Information Bureau and the Anthracite Institute.

A more detailed picture of competitive trends is given in the individual market reviews which follow (also see "How Tough Is Competion?" *Coal Age*, August, 1956, p 54).



UTILITY EXPANSION will take much of coal's increasing production in the years ahead. AGE's Breed Plant above—now under construction near Terre Haute, Ind.—will consume 1,300,000 tons of coal annually.

ELECTRIC UTILITY: '56 Use Up 12%

Leading the market pack again, electric utilities bought 157 million tons in 1956—a 12% boost over the previous year. In 1957, purchases should rise to at least 170 million tons.

Reflecting the long-range trend, *Keystone Coal Buyers Manual*, a *Coal Age* affiliate, predicts an annual average increase of 6% in utility coal use from 1956 through 1960, and of 7% from 1960 through 1965. The prediction is based on direct reports from companies accounting for 75% of total utility consumption.

For the 12-mo period ending September 30, 1956, Federal Power Commission figures show that total coal

Utility Coal Demand

210 Million in 1960; 282 Million in 1965

BASED ON REPORTS from electric utilities using more than 75% of the coal tonnage, coal use will increase an average of 6% a year from 1956 through 1960, and 7% from 1960 through 1965. These reports have been gathered by *Keystone Coal Buyers Manual*, a *Coal Age* affiliate, and indicate that coal consumption will reach 210 million tons a year by 1960 and 282 million by 1965. The pattern of expansion by regions is indicated in the following tabulation of percentage increases each year over the preceding year.

	1957	1958	1959	1960	1965	1965 Over 1956
New England	9.6	4.9	7.0	1.9	56.7	97
Middle Atlantic	5.8	1.8	6.5	7.7	42.0	76
East North Central	9.1	5.0	5.0	5.6	33.6	71
East South Central	6.0	8.0	8.0	7.0	*	*
South Atlantic	3.2	8.3	5.2	4.7	28.1	60
West North Central	2.8	8.2	7.5	9.8	45.7	46
Mountain	5.6	15.8	15.1	15.7	223.0	400

* Not available because of lack of data on TVA use beyond 1960.

Gas use is scheduled for a major increase in areas close to the gas fields, particularly the West and Southwest, according to data derived from the *Keystone* utility-fuel survey. Elsewhere, there are indications that consumption may be on the verge of a decline, if it has not already started. The proposed rate of increase in areas close to the gas fields, *Keystone* observes, is so great as to raise real questions as to the availability and price of gas for remote areas.

Oil use by utilities also will increase rapidly in the next 4 yr, but after 1960 the increases, if any, will be minor. Again, the major expansion will take place in areas close to the producing fields—the West Coast, for example—or, as on the Atlantic Coast, where importing can be done in large volume with a minimum transportation cost.

On the basis of survey results and on the Edison Electric Institute's report on plans for utility expansion by types of fuels, *Keystone* forecasts the consumption by each type of fuel as follows:

	Coal Equivalent—Millions of Tons					
	1956	1957	1958	1959	1960	1965
Coal	155	165	174	180	210	282
Gas	47	53	61	68	71	100
Oil	18	20	22	23	25	28
Nuclear	0	0.03	0.42	0.42	2.82	15

use by utilities is still making heavy relative gains over gas and oil. During that period, utilities used 15.4% more coal, 0.5% more oil and 3.4% more gas than during the corresponding period in 1955.

Summing up the competitive situation before the NCA convention in June, John W. Evers, president, Commonwealth & Edison Co., said:

"Competing fuels are becoming more costly and, in the case of gas, less available for boiler fuel. Coal is abundant and operators have done a fine job of holding down coal prices. If these trends continue, coal is certain to get a bigger and bigger share of the fuel orders from our power companies."

Industrial development in the Ohio River Valley continued to spark important gains for coal in 1956. New aluminum plants, under way or announced for location in the area, will use about 6 million tons of coal annually when completed. Also worthy of special note in 1956:

1. The Ohio Valley Electric Corp. began full-capacity operation of its Kyger Creek and Clifty Creek plants at Cheshire, Ohio, and Madison, Ind., respectively. Together these will supply 2,365,000 kw of electric power to atomic-energy installations in the Portsmouth, Ohio, area. The two plants will consume an estimated 7.2 million tons of coal annually.

2. The American Gas & Electric Co. announced plans to add 2,600,000 kw to its seven-state system during the next 5 yr. The program will give AGE a total generating capability of 6,600,000 kw by 1960—more than all the hydro capacity constructed by TVA in its 23 yr of existence. The entire expansion, costing $700 million, was expected to be under way in 1956.

Nothing new has entered the atomic power picture to change the *Coal Age* forecast (January, 1956, p 54) that:

1. If the country's electric power needs are to be met in 1975, annual coal use for power by that time must climb to 430 million tons, or three times 1955 usage.

2. Atomic energy may never be competitive with coal and other fossil fuels because the country's energy needs beyond 1975 are expected to rise to such magnitude that there will be (a) more energy tasks than fuel supplies, and (b) greater use specialization and mutual dependence among fuels.

STEEL AND CHEMICALS: Growth, Changes Ahead

Despite a 5-wk strike, steel production in 1956 hit 115 million tons, a drop of only 2 million tons from 1955 output. To make this steel, as well as to supply coke-oven-by-product needs of the chemical and gas industries, steel companies used about 112 million tons of coal or 2 million tons less than in 1955. For the same markets in 1957, industry analysts foresee coal use moving up 3 million tons to 115 million tons.

Over the next 15 yr, estimates show that new steel capacity should average 4 million tons a year for a total of 60 million tons. This unprecedented expansion should bring a considerable increase in the demand for coking coals. But this increase will not parallel the increase in pig iron production as has been the historic pattern. Steel companies expect that the coke rate will drop from 1,750 lb of coke per ton of pig iron to 1,500 lb during the next 10 yr (*Coal Age*, May, 1956, p 55). Greater fuel efficiency, accompanied by new techniques for boosting blast furnace output up to 25%, means that coal management must:

1. Keep abreast of the carbonizing requirements of the steel industry. More intensive, continuing sales and technical research is indicated. In particular, watch the trends to lower grade and blended coking coals, sintering and pelletizing.

2. Investigate the prospects of converting steam-raising coals into briquettes or other forms suitable for direct blast-furnace use.

3. Check new or growing market opportunities in steel. By 1980, for example, the annual production of taconite pellets is expected to reach 40 million tons. Power for processing this

output will require more than 1.5 million tons of bituminous coal.

"Process steam consumption is another item that seems to be growing," Charles R. Hook, chairman, Armco Steel Corp., told the NCA Convention in June. "The coal industry can gain a lot of ground here where it is competitive with other fuels. Armco's Middletown plant has doubled its process steam consumption within 5 yr."

There are no signs of abatement in the demand for coke chemicals in the years ahead. But coal management should continue to keep a close eye on the direct production of chemicals from coal, which offers still greater potentials. Speaking on the subject at the June NCA convention, Dr. Joseph Davidson, vice president, Union Carbide & Carbon Corp., said:

"It will probably be another year or so before we can finally run up the flag again (on commercial hydrogenation of coal) but by that time I think we will be able to do it." The minimum-size hydrogenation plant should process 1,000 tpd of coal; the maximum size may handle 3,000 to 6,000 tpd, Mr. Davidson said.

Another highlight of the chemicals-from-coal year: the Pittsburgh Consolidation Coal Co. announced plans in August for constructing a $25 million coal carbonization plant near Cresap, West Virginia. Most of the plant's yield (70 to 75%) will be char for power plant use, but some 65 million gal of coal liquids will also be produced for refining into high order chemicals.

STEEL COMPANIES look for a major drop in the coke rate during the next 10 yr—one sign that coal should keep a close watch on changing technology in the steel industry.

INDUSTRIAL: Climbing Fast; New Stature Seen

Sales to general industry rose 13% over 1955 to 108 million tons (including 98 million tons to "other industrials" and 10 million tons to cement mills). Percentage-wise, the sales jump was second only to export. Volume-wise, the boost still kept the industrial market, as customarily defined, at its usual third-ranking spot behind utilities and steel. However, 1956 saw the emergence of a much more comprehensive definition which will undoubtedly upgrade the size and importance of the industrial market in the years ahead.

By the new definition, the industrial market comprises the entire group of customers falling between the strictly household consumer and the big industrial outlet—small- and medium-size industrial plants, commercial buildings, schools, hospitals, apartment houses, etc. Sales to the group in 1955 have been estimated at 150 million tons; they might have climbed to 165 million tons in 1956; they could rival the utility market in volume and potential for growth.

The revised definition took on new stature when the industry gave virtually unqualified backing to the formation in October of Bituminous Coal Institute. With its starting staff and organization now completed (*Coal Age*, January, 1957, p 54), the institute gives real promise of pioneering a new era in merchandising to the industrial market. To develop the full potentials of the "commercial market," as the industrial market is frequently called, BCI aims specifically to:

1. Give engineering assistance to existing and potential coal users, architects, consulting engineers, etc., through field representatives.

2. Develop sound engineering data, designs, recommendations and general information on modern coal-burning installations.

3. Undertake market research that will define who are coal's existing and potential customers, and where they are.

4. Expand advertising and public relations efforts to foster public acceptance of coal.

The time for launching BCI could hardly be riper. During the past year, NCA's regional market promotion managers (now BCI field representatives or district engineers) reported an increasing number of cases which leave little doubt (1) that competitive fuels have often oversold their case, and (2) that the surface has only been scratched in selling the advantages of coal and coal-burning equipment. And such events as the following provided further grist for the mill: an October, 1956, survey of 79 cities in 25 states showed that coal costs were less than No. 5 oil in all cases and less than gas in all but six cases.

RETAIL: Firm; Perhaps Staging Mild Comeback

Retail deliveries held firm in 1956, reaching an estimated 54 million tons, up 1 million tons over 1955. Industry forecasters look for a dip of 2 million tons this year. But sentiment is increasing that the retail market should level off in the years ahead and perhaps show some upward trend.

On the one hand, optimism is based on widespread confidence in the industry's new, total-selling program as encompassed by the newly-formed Bituminous Coal Institute. BCI should provide a strong prop for sales to a large segment of the retail market including schools, hospitals, apartment houses, etc.

On the other hand, the rising trend in gas and oil prices plus the advent of improved, automatic coal-burning equipment has set the stage for an upward movement in the retail market, both in total sales and in number of customers. To convert a potential upward movement into an actual one, *Coal Age* pointed out (August, 1956, p 58) that the industry must:

1. Take the story of modern coal-heating equipment to customers and prospects.

2. Offer complete merchandising and engineering service such as now extended by the Bituminous Coal Institute.

3. Expedite research on automatic equipment which will give customers the same cleanliness and convenience as other fuels.

4. Prepare detailed lists of existing customers and prospects for use in mail promotion and contact sales campaigns.

5. Develop indirect and alternate ways of getting coal into residential buildings—for example, electric space heating.

RAILROAD: Dips Again; Recovery Hopes Stronger

Sales to railroads fell from 15 million tons in 1955 to 12 million tons in 1956. Another 3-million ton drop is expected this year.

The whitest hope for arresting continued decline in the market remains the coal-fired gas turbine locomotive. And real progress on its development was reported in 1956 by P. R. Broadley, who heads up the locomotive project for Bituminous Coal Research, Inc.

Mr. Broadley told the BCR convention in April that "the 1955 test program subjected the LDC gas turbine to long hours of operation at load factors far in excess of normal locomotive operating practice. The general operation of the plant was much more satisfactory than in any previous test program."

Putting these results into concrete terms, Mr. Broadley added that the fuel and lubricating oil cost of the coal-fired gas turbine (operating in a locomotive year of 4,000 hr) would be about $49,000 less than for diesels.

The Locomotive Development Committee plans to start construction of a production model in 1957, which will incorporate further design improvements. If this model bears out the promise of the stationary model, coal may look forward to recovery of a major portion of the railroad market.

EXPORT: Overseas Peak In '56; Future Bright

For the second year in a row, overseas exports defied the rosiest predictions. Total overseas shipments in 1956 (excluding Canada) hit about 48 million tons—setting a new historical record some 5 million tons ahead of the previous 1947 peak, 14 million tons higher than in 1955, and 33 million tons above 1954. Even the Canadian market showed unexpected vigor, rising from 17 million tons in 1955 to 19 million tons in 1956.

Total exports last year—67 million tons—did not quite eclipse the record high of 68.6 million tons set in 1947. But there seems little doubt that 1957 will see the old mark topple and a new one set of at least 74 million tons: 55 million tons to overseas countries and 19 million tons to Canada.

The upward movement of U. S. coal shipments is based primarily on a normal average annual growth of from 5% to 8% in the industrial output of western European countries (*Coal Age*, March, 1956, p 57). But the surge in 1957 exports will also be bolstered in those countries by increased fuel needs arising out of the Suez crisis, by a severe drop in Polish exports and by some probable cutbacks in local output, such as in Belgium where labor is reportedly moving away from the mines.

Highlighting the 1956 export year was the formation in June of American Coal Shipping, Inc., to tackle the problem of rising ocean freight costs and, generally, to protect the industry's big, growing stake in the overseas market. The $50 million corporation—organized by a unique combination of producers, brokers, the UMWA, and coal-carrying railroads – named William Conant Brewer, N. Y. shipping executive, as its president. Under his leadership, the new agency has already piled up a fair record of accomplishment (1) by successfully fighting off shipping-company opposition to its chartering of 30 government-owned Liberty ships, and (2) by purchasing the 15-vessel Bull Lines for a reported $40 million. Also, studies were made on building an ACS fleet and on the prospects of improving overseas port facilities at strategic unloading points.

But, along with this progress, ACS also had its headaches as it came into the new year. Among these:

1. During the last quarter of 1956, the basic ocean freight rate (Norfolk to Rotterdam) skyrocketed from about $11 per ton to about $16 per ton, causing some overseas buyers to postpone orders.

2. Two AFL-CIO unions threatened to reopen charter authorizations with the USMC because they claimed that ACS was welching on "assurances" of contracts covering officers and engineers of its ships.

3. The arrival overseas of too many "cocktail mixes"—odd-lot nonspecification cargoes—were said to be generating resentment and protest among foreign coal purchasers.

Informed observers believe the rate situation will naturally adjust itself downward as the supply of coal-carrying ships catches up with booming demand. ACS expects its first Libertys to come into operation during the first half of 1957 and has under consideration a request to the USMC for 50 more. Along with these, private shipping companies (including the ACS Bull Lines) have petitioned the USMC for a total of 150 vessels, 85 of which got the breakout nod in January.

On its labor problem, ACS has denied AFL-CIO charges and is otherwise playing a quiet, waiting game. Presumably, John L. Lewis' guiding hand will pull this chestnut out of the fire without dire effect.

No plan has crystallized to ensure quality coal shipments overseas. However, discussions are increasing about setting up an export marketing agency to handle this problem, as well as to streamline cumbersome marketing procedures and to initiate a public relations program aimed at keeping the overseas trade informed on what the U. S. coal industry is doing for its benefit.

Problems in '57

MANAGEMENT: Planning To Meet Top Needs

Bituminous executives in 1956 took a real hard look at what was needed most to share in the rich promise of industry growth. Their reactions focused generally on greater mine capacity, higher output per man-shift, more effective merchandising, better personnel recruitment and training, and company mergers.

A *Coal Age* study ("Building for 1960," September, 1956) showed that the bituminous industry planned to:

1. Raise productive capacity from 550 million tons in 1955 to 675-700 million tons by 1960—a modest margin

How the Top 15 Coal-Producing Groups Ranked in 1956

Compiled by Keystone Coal Buyers Manual, A Coal Age Affiliate

GROUP OR COMPANY	1956 Tonnage	% Change, 1955 to 1956	1955 Tonnage	% Change, 1954 to 1955	Standing 1956	1955	1954	1953
Pittsburgh Consolidation Group*	31,724,380[1]	+13.3	28,001,044	+22.2	1	1	1	1
U. S. Steel (c)	22,889,712	− 9.0	25,159,319	+11.0	2	2	2	2
Peabody Group*	21,698,493[10]	+59.9	13,663,920[4]	+95.1	3	3	8	3
Island Creek*	14,782,405[6]	+44.9	10,247,134	+26.8	4	4	5	6
Eastern Gas & Fuel*	10,472,274[4]	+12.5	9,307,068	+14.4	5	6	4	5
Pittston Group*	10,391,461	+28.9	8,058,130	+24.0	6	7	9	8
Bethlehem Steel (c)	9,507,478[3]	− 3.9	9,886,274	+22.5	7	5	6	4
Pocahontas Fuel*	9,160,547[5]	+23.8	7,400,415[11]	+21.3	8	9	10	11
Truax-Traer	8,045,155	+ 5.0	7,661,498	+ 6.3	9	8	7	9
West Kentucky Group*	7,714,649[8]	+88.4	4,093,715[8]	+51.2	10	19	29	24
Freeman	6,877,267	+ 5.0	6,550,000[7]	+121.0	11	10	23	26
North American Group*	6,078,342[9]	+14.0	5,330,875	+39.0	12	13	14	14
Ayrshire*	5,587,387[10]	+14.7	4,781,068	+34.0	13	16	18	23
Republic Steel (c)	5,347,506	− 8.3	5,832,513	+61.2	14	11	17	10
Berwind-White Group	5,097,560	+ 4.0	4,895,840	+10.8	15	15	13	13
Total	175,374,616	+16.2						

(c) Captive.

* Percentage change, 1956-55, better than national average increase of 6.4%.

1. Includes Pocahontas Fuel after Dec. 1. 2. Sinclair tonnages before merger not included. 3. Includes Consolidation Coal Co. Kentucky Div. after Nov. 1. 4. Includes Ebensburg Coal Co. after Aug. 1. 5. To Dec. 1, includes Peerless Coal & Coke from Oct. 1 to Dec. 1.

6. Includes Red Jacket from Jan. 1. 7. Includes C.W.&F. Coal Co. from Jan. 1, 1955. 8. Includes Nashville Coal after merger. 9. Includes Consemaugh Mining Co. after May 1, 1956. 10. Includes half of Gibraltar production. 11. Includes American Coal Co. after merger.

COLLECTIVELY, the industry's top 15 organizations in 1956 produced 35.0% of the total bituminous and lignite mined. Nine of these 15 producing groups showed gains in excess of the industry average, with seven being affected by merger or purchases. Their 1956 tonnage gains averaged 16.2% above 1955, compared with the industry average of 6.4%. This record was made despite the fact that all three captive operators showed a decline due to the steel strike.

Output of the 15 top ranking groups in 1955 was 153,536,509 tons or 33.0% of the total. Ten years ago, in 1946, the top 15 produced 130,109,948 tons, or 24.5% of the total.

Note: No anthracite company ranked with the top 15 in 1956.

over the expected demand of 610 million tons.

2. Increase output per man-shift over 3 tons at deep mines and nearly 4 tons at strip mines.

3. Spend about $1.5 billion for the development of existing properties and new mines.

The same study also showed that producers rated the following as most important in stepping up output per man-shift: faster, higher capacity haulage systems, particularly underground; better equipment for difficult mining conditions; improved personnel recruitment and training; lower-cost maintenance; and more effective roof control.

On the merchandising level, the industry gave unqualified backing to the formation in October of Bituminous Coal Institute (*Coal Age,* January, 1957, p 54). Through this agency, producers plan to attack the big four trouble spots in industry selling: inadequate engineering aid and market research, lack of coordination among existing marketing groups and relatively weak public relations and advertising. BCI's initial target will be the large mystery group of off-track and on-track customers falling between the strictly household consumer and the big industrial outlet.

Also in the management picture: more mergers took place to broaden the base of company income and to improve production and marketing facilities. Notable among these, the Pittsburgh Consolidation Coal Co. (through a stock exchange) acquired a controlling interest in the Pocahontas Fuel Co. Combined output of the two companies in 1956 was estimated at 40 million tons. In another case, the Pittston Co. bought a majority block of Clinchfield Coal Corp. stock, giving the Pittston group a total estimated 1956 production of 9 million tons.

With more mergers in prospect, *Keystone* estimates that by 1960 the top 15 producers will mine 225 million tons, up nearly 50% over the 153 million tons produced by the top 15 in 1955.

LABOR FRONT: Wages Up; Continued Peace Likely

"For six years now there have been no major stoppages in the industry, and for an indefinite period into the future that will continue, providing the leaders of the industry on both sides continue to exercise that discretion and judgment which they now have exhibited that they possess. I suppose they had it all the time but wouldn't use it. The industry and the public interest will be served by this abatement of national conflict in the coal industry. It is giving the industry time for reorganization of its productive and marketing policies and practices . . ."

Thus, John L. Lewis summed up the prospects for and the benefits of continued labor peace. He made the remarks at the UMW Convention in Cincinnati, Ohio, Oct. 3, after UMWA secretary-treasurer, John Owens, had announced the second peaceful wage boost negotiated by bituminous producers and the UMWA during the past 2 yr.

By the terms of the 1956 wage boost, the miners' new contract gave them a $2 daily pay increase, of which $1.20 became effective Oct. 1 and $0.80 will become effective April 1, 1957. On April 1, the basic daily wage will total $22.25, up $4 or 22% since August, 1955.

Besides the direct wage boost, the new contract raised summer vacation payment from $140 to $180 for an 11-day period. It added a new clause providing $40 pay for a winter vacation period of 3 days in December. In another new clause, producers must pay double time (instead of time and one-half) on seven established holidays. Sunday work will also be paid for at the double time rate and Satur-

day work at time-and-one-half.

Announcement of the labor pact set off a series of price increases. But the price hikes were relatively small. More efficient operation of properties through astute management and greater investment in modern mining machinery enabled producers to absorb most of the added wage cost. On the basis of the Oct. 1 wage hike ($1.20), prices for eastern coals generally advanced 35c to 40c a ton and midwestern coals around 25c a ton. Further increases are scheduled when the second part of the wage boost ($0.80) becomes effective April 1, 1957. Southern producers expected that the new contract would result in added costs of 56½c a ton.

Although proud of the second peaceful wage boost in many years, labor chief Lewis showed deep concern about the wildcat strikes that still plagued the industry. At the UMW convention, he gave stern notice to delegates that such unauthorized interferences with production would not be tolerated. Heavy fines against the locals were the least of the penalties already imposed and promised for future transgressions.

TRANSPORT: Rail Rates Rise; New Methods Gain

The past year saw a further upward spiraling in freight rates, leaving shippers with this seemingly inevitable prospect: either bear them and look forward to more, or find ways to get around rail transport.

In March, the Interstate Commerce Commission authorized a 6% maximum increase in line-haul rates on anthracite and bituminous. The blow was softened somewhat with the provision that the increase should not exceed 15c a ton. Lignite rates were jumped 3% or a maximum of 7c a ton.

In December, the ICC authorized another freight rate hike, effective on the 28th of the same month: 7% within Eastern Territory, 5% in the West and, interterritorially, between the East, West and South. No increases between points in the South had been authorized, but southern carriers were due to be heard in January.

Generally, the second freight rate hike meant an added 10c a ton on coal shipments. Exceptions, involving a 5c a ton increase, applied to lignite and to some first-rail, combined rail-water, Great Lakes and export shipments (*Coal Age*, January, 1957, p 122).

Not yet satisfied, eastern and western railroads have already announced plans to seek another freight rate boost —15%—in 1957. Most observers look for the ICC to consider this request in February. The railroads claim that they need the added 15% increase if they are to realize the return necessary to buy cars at the rate of interest now being charged.

Still high on the agenda to alleviate the pangs of constantly rising freight rates are the development of new, alternate and substitute methods for carrying coal.

For example, the Pittsburgh Consolidation Coal Co. announced completion of its 108-mi coal pipeline—designed to carry roughly 3,600 tpd of coal in solution from a point near Cadiz, Ohio, to Eastlake, Ohio. Successful performance of the line could well mark it as the forerunner of others to come.

Speaking on increasing river transport at the annual meeting of the Illinois Mining Institute, Springfield, Ill., Oct. 26, C. W. Waterman Jr., general manager, McNally-Pittsburg Co., commented:

"Taking the common carriers as a whole, we find that railroads, barge, pipelines and trucks have made the following increases over the past 10 yr: railroads maintained a steady rate; barge transport increased 50%; pipelines about 100%; trucks about 150%. The increase in truck haulage cannot be directly chargeable to coal and certainly pipelines are not looking to coal for their increase in tonnage. On the other hand, coal can be held almost wholly responsible for the increase in barge traffic."

Another increasingly important twist in transport is to eliminate or minimize it through the location of industrial plants at or near coal-producing centers. The past year, for example, saw further migration of the electrochemical processing industries to the Ohio River Valley (p 58).

The car shortage still remains a serious bottleneck in mine-to-market shipments. The present schedule of car deliveries is averaging about 1,000 a month. Until deliveries can be stepped up to 2,000 a month—and the current shortage of steel plate may retard this—not much substantial relief is expected.

LEGISLATION: Agenda Heavy; Some Progress

By adjournment time in July, the 84th Congress had tackled a wide variety of bills and resolutions of major importance to coal. Among these were:

1. The Gore bill calling for federal construction of six large nuclear power plants—failed to pass.

2. The Harris bill seeking exemption for independent gas producers from FPC regulation—killed by presidential veto.

3. H. R. 9424, requiring premerger notification—passed by the House but failed in the Senate.

4. Various bills to establish quotas on imported products where they are taking a damaging share of the domestic market—failed to get action.

5. The Saylor Resolution to set up a research and development program for the coal industry—deferred until the current session.

6. Proposals to redefine "employee" in the Fair Labor Standards Act and the Labor Management Act, and to permit industry-wide wage determinations under the Walsh-Healey Public Contracts Act—failed to get any action.

7. Tax measures aimed at repealing the transportation tax on coal (Baker bill), providing a graduated corporate income tax, allowing more equitable percentage depletion, and permitting rapid amortization of pollution abatement facilities—failed to get action. Tax measures that were passed into law expand Social Security coverage, permit special treatment of deferred income and reserves for estimated expenses, and exempt certain real estate investment trust incomes from the corporate income tax.

8. The omnibus transportation bill asking for changes in ICC ratemaking powers—deferred until the current session.

9. A bill requiring TVA to get specific Congressional approval for expanding existing power plants with revenues received—failed to get action.

10. Bills creating a Mineral Resources Department with a secretary of cabinet rank and four undersecretaries, including one for coal—referred to committee without action.

11. The Blatnik bill amending and extending the Water Pollution Control Act—passed.

Many of the above killed or deferred bills and proposals will be brought up again in the 85th Congress now in session. But most in the limelight will be those dealing with coal's fight (a) to restrict imports of oil and natural gas, (b) to repeal the transportation tax on coal, (c) to achieve fairer percentage depletion allowances, and (d) to discourage government subsidy of nuclear power plant construction.

McGraw-Hill Economists See . . .

Business Up Again in 1957

By DORA K. MERRIS
Department of Economics, McGraw-Hill Publishing Co., Inc.

The business boom will continue through 1957. Demand for goods and services now shaping up in various sectors of the economy indicates that gross national product will reach $435 billion. That's a moderate gain of $20 billion over 1956.

Capital goods will be in strong demand this year. A recent McGraw-Hill survey showed that business now plans to install $40.2 billion in capital improvements during the year. Capital investment amounted to $36.3 billion last year. This means a sustained demand for industrial equipment and construction materials through the year.

Consumers are earning more income than ever before. During the fourth quarter of 1956 personal income ran at the annual rate of $334 billion. A year earlier it ran $314 billion. A continued high level of employment should push consumer incomes even higher. High incomes do not necessarily mean a high level of consumer expenditures. But they do mean the consumer can buy goods if he chooses to. And he probably will if industry gives him something he wants to buy.

The Eisenhower policy of cutting government expenditures is over for a time. And Congress will be voting fatter appropriations. Foreign aid programs account for a part of the increase. Highway construction, school building and other public works programs account for more spending at both the federal and state-local levels. This is an added boost for business this year.

Price increases will account for a part of the gain in GNP. The McGraw-Hill capital investment survey indicates that businessmen on the average expect prices of capital goods to increase by 6%. Consumer prices will probably rise by 2%. Gains in physical output, therefore, will be somewhat less than the dollar figures indicate.

Just about every industry will share in the boom. (Housing is the one major exception. Starts may drop to about 1,050,000—70,000 fewer than last year.) An industry by industry run-down of manufacturing points to industrial production index of 148 for the year, compared with 143 last year.

The steel industry, it is estimated, will turn out 120 million tons of ingots and castings. Production this year does not hinge on orders for any single industry. Steel is in heavy demand for freight cars, industrial machinery, shipbuilding, pipelines and autos.

Nonferrous metal production will probably increase 3% over last year. Stockpiling as a result of the Near East fracas will account for a part of the gain.

Chemicals seem in line to beat last year's production record by 6%. Demand for petroleum is developing in several areas. The Suez crisis has boosted foreign demand. Families with rising incomes are likely to need more gasoline for traveling this year, and there will be more autos on the road. A general high level of production will require more fuel for truck transportation.

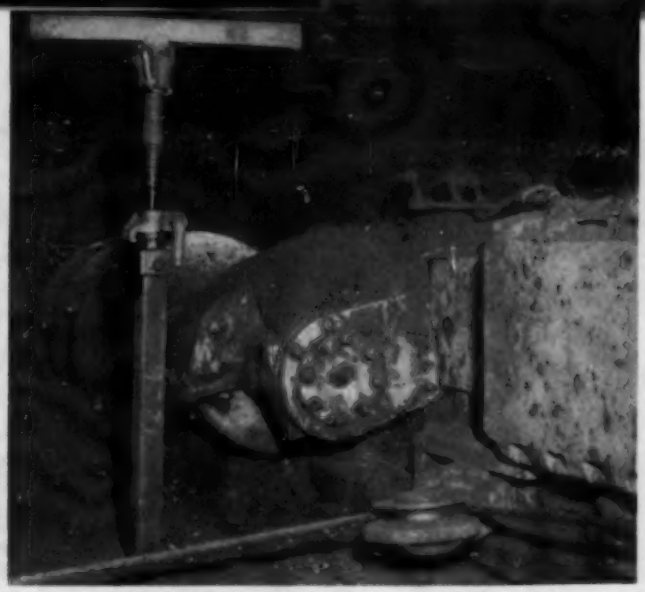
Paper production is normally geared to the over-all level of business. The industry can probably shoot for a 5% gain in production this year.

Orders for industrial and electrical machinery have been so heavy that much of the new business manufacturers pick up now will have to be pushed into 1958. Shipments this year will probably run about 10% over last year.

Large-scale operation of heavy industry will place greater power demands on electrical utilities this year. Industrial consumption of electricity will probably run about 382 billion kwhr, a 7% gain over last year. Residential use, boosted in part by appliance sales, will run around 150 billion kwhr, an 11% gain over last year. Commercial sales will also run higher, about 9% over last year. The long-range demand for electrical power is up.

An offhand look at sales offices clogged with orders might suggest that a spurt in industrial output to match the 11% made in 1955 could be in the making. But this is unlikely. There was little slack in the system last year, when most industries were operating at close to capacity. Some new capacity was added during the year; more will be added this year. That will allow a modest increase, but no sharp spurt. The steady capacity increases will add up to a steady gain in the demand for industrial fuels.

BACK-UP SERVICES, outby the face, were improved in 1956. Net result was increased operating time at the face.



NEW TYPES OF MINING MACHINES promised some of the benefits of single-step recovery to thin-seam operators.

1956 Developments in Mining

Deep Mining

ACCENT ON THE AUXILIARY SERVICES which directly affect production efficiency at the face was one of the striking trends in deep mining in 1956. New types of continuous-mining machines were placed in service in increasing numbers and changes in the cutting heads of some types were made. But mine operators and equipment manufacturers placed major emphasis on developing methods and machines which lead to increased operating time for the mining-and-loading machine.

Indicative of this trend are developments such as improved wet-rockdusting machines, approved fluorescent mine-lighting systems, a new extensible conveyor supported on lateral wire ropes, redesigned roof-bolting machines offering greater stability while holes are drilled and nuts are tightened, and so on. One manufacturer mounted a pair of rotary cutting heads on a shortwall chassis to provide the advantages of single-step mining in thin seams, and machines of this type went into service in West Virginia and in Pennsylvania in 1956.

Other highlights of the year in deep mining included announcements by several big companies of the opening of large integrated mines to serve single customers, such as aluminum plants and large commercial power plants. As the year drew to a close some of these new properties were beginning to produce coal with assurances that in the near future they would be showing the high levels of efficiency that can be achieved in modern coal mining.

OPENING NEW MINES: Over-and-Under or Side-by-Side

Ideas for driving new slopes in varying conditions were reported in 1956.

A West Virginia company constructed a new slope only 10 ft wide, which provided a beltway, manway and supply track, by driving the slope 14 ft high and constructing the beltway and manway at the top and the supply track and escapeway underneath. This was done to head off probable troubles in going through unstable strata.

The partition between upper and lower portions was supported by steel rails on 12-ft centers which had been inserted into holes in the ribs. A layer of concrete then was poured on corrugated steel sections which had been laid on the rails. Corrugated tunnel liner was used in sections of the 826-ft-long slope where unstable rock was encountered (*Coal Age*, April, 1956, p 54.)

At one of the new large mines, also in West Virginia, an extensible belt was used in driving a slope. Teamed with a crawler-mounted rock loader, the extensible unit was instrumental in conserving manpower to the point where a 4-man crew and foreman were able to advance the 9x18-ft slope up to 10 ft per shift. A special 100-ft takeup was built for the belt to permit the tail section to be trammed up the slope a safe distance while blasting was done. Other advantages of the belt-and-loader combination are (1) a better cleanup at proper grade is possible, (2) there are no sheaves to place as with a slusher, (3) hand loading is eliminated, (4) no track is required and (5) rate of loading is faster. Furthermore, the extensible belt will be used in producing sections underground when the slope is completed.

The work of the crew includes the installation of roof bolts throughout the slope, which is lined to finished dimensions 7 ft high and 16 ft wide, as explained in the November, 1956, issue of *Coal Age*, p 68.

MINING METHODS: Pillaring With Continuous Mining Units

Increased emphasis on developing methods for pillaring with continuous mining machines was evident in most regions. The goal was to get more coal for each dollar invested in development work and equipment and, as a corollary, to extend reserves by increasing percentage recovery. Reports from several large mines showed that good roof action was being achieved in open-end pillaring, while others were successful using pocket-and-fender systems in areas having more tender roof. Use of roof bolts in the pillar cuts and adjustment of the sizes of pillars made the pillaring operation much safer for the men at the face.

At an industry meeting late in the

60-YD SHOVEL swung into steady operation, proving that maximum size of stripping units has not yet been reached.

ASSURANCES OF LOW COST COAL from augers permitted operators to increase ratios and extend strip-mine life.

and Preparation

year, an official of a western Pennsylvania mine reported that tons per man shift in retreat work with continuous miners was 55% greater than that in conventional mining under similar conditions. In the State of Washington, 5-man crews using continuous miners in retreat were maintaining an average output of 28 tons per man shift in spite of the fact that the seam pitches up to 15 deg and 11 bd ft of timber must be installed for every ton of coal removed (*Coal Age*, August, 1956, p 60). The mining machines at this property discharge into shaking conveyors.

In the Midwest, more and more mines converted to systems including second mining as a regular practice, and success crowned the effort in most places. A net result is that concentration of operations continued throughout 1956, as it has since full-scale mechanization became the order of the times in American coal mining. And hand-in-hand with increased concentration go the added beneficial possibilities for more efficient ventilation, reduced service labor, lower investment in transportation equipment, better drainage and lower-cost power distribution.

TRANSPORTATION: Mine Cars, Belts, Conveyors

Ways and means of moving coal from face to tipple again came in for a lion's share of attention. An underground main-haulage system in a Kentucky mine, described in the January, 1956, issue of *Coal Age*, employs 25-ton cars, automatic loading at belt heads and electric track switches to permit one man, the motorman, to handle the entire main haulage of the 4,000-tpd mine.

Belt conveyor haulage took some long leaps forward. One extensible unit developed at a western Pennsylvania mine has successfully conveyed coal around two 90-deg turns. A special cornering device, developed at the mine, makes possible this unusual application.

An Illinois mine received the first production model of a rope-belt system of transportation, which may be either stationary or extensible. The belt itself is carried on idler assemblies suspended from two lateral wire ropes. The extensible rope-belt conveyor is fed from a bridge conveyor which makes a direct link with a continuous-mining machine. The advantages in this type conveyor are fewer supplies to erect a given length of conveyor, faster erection and dismantling and minumum storage-space requirements.

At the previously mentioned mine in the State of Washington, special methods have been worked out to make conveyor transportation more efficient. For example, the continuous miners in advancing a room also drive crosscuts in an outby direction to be intersected by the next room to be driven. Then as the inby pillars are recovered, supplies from the pan line and spare timbers are stored in these blind crosscuts and are retrieved as the next room is driven to tap the blind crosscuts. Methods like these make a substantial contribution to the high productivity of the face mining crews.

Near the close of the year, announcement was made that the manufacture and sale of a single-motor shuttle car with torque-converter drive, developed by a major coal company, would be taken over by a large manufacturer. This new unit may be powered by AC or DC power and is said to offer low maintenance costs. A subsidiary of the coal company already has built 50 cars, some of which have been under test and refinement for as long as 4 yr.

As a parting shot on transportation, it should be mentioned that a coal company recently changed the gage of 4 mi of track from 44 in to 48 in at a newly acquired mine in Kentucky. This almost unheard of task was undertaken to match the gage at the new mine with that of others operated by the company in the interest of standardization and interchangeability of equipment. The conversion was made over a single weekend by mine employees.

SERVICES: Accent on Ventilation, Travel Time

Dirt thrown up in the construction of new field portals and field airshafts dotted the mining regions. These, too, are side effects of the continuing trend toward concentration. The object is to get the men and fresh air into the producing sections by the shortest possible routes. At one such facility in central Pennsylvania a ramp was designed at the foot of the shaft which permits complete separation of the manway and airway in the interest of cold-weather comfort for the men. At another in the same area, the company, is building a store and service station to make the field portal

a self-sufficient outpost, independent of the main portal and its service facilities.

Numerous mines developed schemes for transporting unit crews in individual man cars. The result is substantial reductions in travel time—54 min at one mine.

Bleeder systems for draining worked-out areas received a lot of attention, and streamlining of ventilation systems proved to be a real money saver at certain properties. And as the old year died, word came in that a new mine in western Pennsylvania will attempt to eliminate acid formation in mine water by drilling a borehole down through the bottom seam to serve as a sump, thus keeping water away from acid-forming materials until it can be taken up by the mine pumps.

Stripping

THE BIG NEWS in stripping in 1956 was the successful application of the mammoth 60-yd shovel and word that 70-yd machines are being built. Tearing off the overburden at a rate well over 2,000,000 cu yd per month, the giant stripper has proved its mettle. Absence of serious breakdowns also has proved the soundness of the basic design. In the past year there also were additions of new or improved types of overburden drills. Explosives manufacturers moved forward by offering a wider variety of products to strip operators. But experiments also continued to be made with new mixtures in the never-ending search for lower cost and better fragmentation. Progress also was noted in haulage units, with the addition of a 70-ton trailer in West Virginia.

DRILLING AND BLASTING:
Keeps Pace With Stripping

The desire and need to gear drilling and blasting to the faster pace in handling overburden took a major share of the spotlight in the past year. As the cover became thicker, stripping ratios rose correspondingly, and drilling and blasting became more of a problem. To match drilling capacity with stripping capacity in the thicker cover more large vertical drytype rotary overburden drills came into use.

But the big drills were not always in the limelight. In rugged mountain country both horizontal and vertical drills were used to permit explosives to break the coal effectively and leave the highwall sheared smoothly for later augering. And to meet rapidly

New Bituminous Preparation Facilities

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Alabama By-Products Corp.	Maxine, Ala. (6)	60	Deister Concentrator[1]
Alabama Power Co.	High Level, Ala.	50	Deister Machine [2]
Allison Engineering Co.	Foxburg, Pa.	...	Nelson L. Davis[3]
	Sligo, Pa.	100	Nelson L. Davis[4]
American Coal Co. of Allegany County	Deerfield, W. Va.	275	Daniels[5]
Amherst Coal Co.	Amherstdale, W. Va.	70	Elmco[6]
	Lundale, W. Va.	15	Kanawha[7] Heyl & Patterson[7]
	Ronsford, W. Va.	15	Kanawha[7] Heyl & Patterson[7]
Amigo Smokeless Coal Co.	Wyco, W. Va.	...	Link-Belt[8]
Badger Coal Co.	Phillipi, W. Va.	250	McNally Pittsburg[9]
Barnes & Tucker Co.	Barnesboro, Pa.	5	Elmco[6]
		20	Heyl & Patterson[11]
		5	Heyl & Patterson[12]
Berwind-White Coal Mining Co.	St. Michaels, Pa.	100	Roberts & Schaefer[13]
Big Run Coal & Clay Co.	Princess, Ky.	60	Jeffrey[13]
Bird Coal Co.	Krings, Pa.	245	Roberts & Schaefer[14]
	Krings, Pa. (8)	8	Dorr Co.[15]
	Riverside, Pa.	50	Roberts & Schaefer[13]
Buckeye Coal & Coke Co.	Stephenson, W. Va. (2)	5	Dorr[16]
Brule Smokeless Coal Co.	Otsego, W. Va. (12)	120	Deister Concentrator[1]
	Otsego, W. Va.	70	Robert Holmes[17]
Callahan Coal Co.	Reynoldsville, Pa.	70	Fuel Process[18]
Carbon Fuel Co.	Winifrede, W. Va. (7)	70	Deister Concentrator[1]
	Winifrede, W. Va.	15	Elmco[6]
	Winifrede, W. Va.	60	Heyl & Patterson[19]
Christopher Coal Co.	Morgantown, W. Va.	1,320	Fairmont[20] Deister Concentrator[20] Dorr[20] Peterson Filters[20]
Clinchfield Coal Corp.	Dante, Va. (20)	200	Deister Concentrator[1]
	Haysi, Va.	225	Daniels[5]
	Haysi, Va.	112	Roberts & Schaefer[21]
Columbia-Southern Chemical Corp.	Midvale, Ohio	60	Roberts & Schaefer[22]
Columbus & So. Ohio Electric Co.	Connesville, Ohio	700	McNally Pittsburg
Compass Coal Co.	Dola, W. Va. (30)	500	Industrial Engr.[23] Fairmont[23] Deister Concentrator[23] Dorr[23]
Crozer Coal & Land Co.	Dott, W. Va.	230	McNally Pittsburg
	Lynco, W. Va.	65	Roberts & Schaefer[21]
Dial Coal Co.	Branchland, W. Va.	8	Deister Concentrator[1]
Eastern Gas & Fuel Associates	Colver, Pa.	100	Roberts & Schaefer[21]
	Helen, W. Va.	150	Industrial Engr.[23]
	Keystone, W. Va.	750	Industrial Engr.[24]
Freeman Coal Mining Co.	Waltonville, Ill.	175	Nelson L. Davis[4]
Greer Clintwood Coal Co.	Darwin, Va. (5)	60	Deister Machine [1]
Hanna Coal Co.	Crosap, W. Va.	...	Dorr[25]
Harlan Fuel Co.	Yancey, Ky.	500	Daniels[5]
Harmon Creek Coal Co.	Burgettstown, Pa.	30	Fuel Process[18]
Hi-Hat Elkhorn Mining Co.	Hi-Hat, Ky.	150	McNally Pittsburg[13]
Hoffman Coal Co.	Karthaus, Pa.	150	Daniels[5]
Imperial Coal Corp.	Clymer, Pa.	150	Wilmot[26]
Inland Steel Co.	Wheelwright, Ky.	...	Link-Belt
	Wheelwright, Ky.	...	Dorr[27]
Island Creek Coal Co.	Holden, W. Va.	10	Heyl & Patterson[11]
Jamison Coal & Coke Co.	Fairview, W. Va.	1,500	Fairmont[23] Jeffrey[23] Dorr[23]
Jewell Eagle Coal Co.	Stollings, W. Va. (8)	64	Deister Concentrator[1]
Jewell Ridge Coal Co.	Jewell Valley, Va.	100	Roberts & Schaefer[21]
	Tazewell, Va.	30	Elmco[6]
Jerry Fork Coal Co.	Summersville, W. Va.	150	Fuel Process[28]
Joanne Coal Co.	Rachel, W. Va.	...	Industrial Engr.[23]
Johnstown Coal & Coke Co.	Johnstown, Pa.	10	Heyl & Patterson[11]
Kentucky Ridge Coal Co.	Fields, Ky.	275	Daniels[5]
Key Coal Co.	Frederick, Ill.	400	McNally Pittsburg[9]
Knight Ideal Coal Co.	Wellington, Utah	150	Nelson L. Davis[29]
Lake Superior Coal Co.	Superior, W. Va.	300	Kanawha[30] Jeffrey[30] Elmco[6] Heyl & Patterson[30]
Lillybrook Coal Co.	Killarney, W. Va.	30	Fuel Process[18]
Locksley Fuel Corp.	Morgantown, W. Va.	70	Roberts & Schaefer[21]
Maumee Collieries Co.	Riley, Ind.	150	McNally Pittsburg[31]

Contracted for in 1956*

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
C. H. Mead Coal Co.	East Gulf, W. Va.	140	Roberts & Schaefer[21]
Melayne Pocahontas Coal Co.	Arista, W. Va.	2	Elmco[6]
Monitoau Coal Corp.	Branchton, Pa.	...	Jeffrey[12]
Nashville Coal Co.	Madisonville, Ky.	400	Jeffrey[12]
	Uniontown, Ky.	290	McNally Pittsburg[35]
David Z. Norton Co.	Onco, Ohio	85	Robert Holmes[17]
Old Ben Coal Corp.	Valier, Ill. (3)	30	McNally Pittsburg[1] Deister Concentrator[1]
Olga Coal Co.	Coalwood, W. Va.	17	Dorr[23]
Peabody Coal Co.	St. Louis, Mo.	1,500	McNally Pittsburg[31]
Pittito Bros. Coal Co.	Lost Creek, W. Va.	150	Fuel Process[13]
Pine Township Coal Co.	Hellwood, Pa.	175	Wilmot[18] Robert Holmes[17]
Piney River Coal Co.	Fireco, W. Va.	60	Fuel Process[13]
Pocahontas Fuel Co.	Pocahontas, Va.	200	Daniels[4]
	McComas, W. Va.	275	Daniels[4]
Red Ash Coal Co.	Acton, Ala.	12	Deister Machine[2]
Republic Steel Co.	...	60	Heyl & Patterson[19]
Ridgeview Coal Co.	Ridgeview, W. Va.	150	Kanawha[38]
River Queen Coal Co.	Central City, Ky.	750	McNally Pittsburg[37]
	Central City, Ky.	1,000	McNally Pittsburg[31]
Rochester & Pittsburgh Coal Co.	Four States, W. Va.	60	Industrial Engr.[32] Roberts & Schaefer[21] Kanawha
Royalty Smokeless Coal Co.	Clifftop, W. Va.	17	Elmco[6] Heyl & Patterson[19]
Sahara Coal Co.	Harrisburg, Ill.	...	Nelson L. Davis
	Harrisburg, Ill.	75	McNally Pittsburg[34]
Saxton Coal Co.	Petersburg, Ind.	500	McNally Pittsburg[39]
Semet Solvay Div.	Harewood, W. Va.	130	Kanawha[46]
Slab Fork Coal Co.	Alpoca, W. Va.	200	Daniels[4]
	Slab Fork, W. Va.	100	Kanawha
Spruce River Coal Co.	Jeffrey, W. Va.	250	Daniels[4]
W. P. Stahlman	Corsica, Pa.	150	Jeffrey[12]
Terteling Bros., Inc.	Madisonville, Ky.	350	McNally Pittsburg[35]
United States Steel Corp.	Gary, W. Va. (8)	64	Deister Concentrator[1]
	Gary, W. Va. (12)	...	Dorr[41]
Valley Camp Coal Co.	Elm Grove, W. Va.	...	Kanawha[42]
	Shrewsbury, W. Va.	60	Kanawha[42]
Westmoreland Mining Co.	...	10	Heyl & Patterson[44]
Williams River Coal Co.	Cowen, W. Va.	120	Fuel Process[13]
Wyatt Coal Co.	Eskdale, W. Va.	200	Kanawha[42]

*Includes contracts for installation of new preparation equipment in existing structures. Where more than one equipment item was installed, the number, when known, is shown in parentheses following the plant address.

1. SuperDuty Diagonal Deck coal-washing tables with Concenco revolving feed distributors as follows: Alabama By-Products, 1; Brule Smokeless, 2; Carbon Fuel, 1; Clinchfield, 2; U. S. Steel, Robena, 6; Gary, 12. 2. Deister Flat-O washing tables. 3. Storage system. 4. Neldco heavy-media equipment. 5. Preparation plant, including DMS dense-media system.

6. Elmco coal-filtration equipment and auxiliaries. 7. Fine-coal reclamation and clarification, including cyclones. 8. Heavy-media washing plant. 9. Including McNally Tromp heavy-medium equipment. 10. Hydrotator equipment.

11. Fine-coal jig equipment. 12. Single-stage cyclone recovery circuit. 13. Unit washer. 14. New plant with heavy media (115 tph) and Super Airflow equipment (130 tph). 15. American disc filter, with Dorr also supplying thickener for magnetite recovery and 6 Dorrclones.

16. Dorr thickener and American disc filter. 17. Baughman Verti-Vane drying equipment. 18. Belknap washing equipment. 19. Reineveld centrifuge and cyclones. 20. Including 5,000-ton blending bin, Chance cones, 38 SuperDuty Diagonal Deck tables, 10 Concenco revolving feed distributors, one 100- and one 140-ft Dorr thickeners, Peterson filters and river-loading terminal.

21. Super Airflow cleaning equipment. 22. Including Chance cone, 7 SuperDuty Diagonal Deck tables, Concenco revolving feed distributor, two American disc filters, 18 Dorrclones, 76-ft Dorr thickener. 23. Fine-coal plant, including air cleaners and dust collectors. 24. ROM and rock-handling facilities, including 500-ton bin. 25. Dorr thickener.

26. Preparation plant including Wilmot-OCC heavy-media system. 27. Dorrco FluoSolids fine-coal dryer. 28. Jeffrey Baum-jig equipment. 29. Belknap heavy-media washer. 30. Wet scrubber dust collector.

31. Coal-handling and barge-loading installation. 32. Neldco heavy-media washing equipment with Neldco thermal dryer. 33. Cyclone clarification equipment. 34. McNally Vissac dryer. 35. McNally Norton automatic washer.

36. Ground-storage system. 37. McNally Giant washer. 38. Two-stage cyclone recovery circuit. 39. Including McNally Norton automatic washer and centrifugal drying equipment. 40. Middlings crushing and recirculating system to table plant.

41. Two Dorrco FluoSolids fine-coal dryers, 600 tph; 8 Dorrco bowl desilters, 36,000 tpd; two Dorr Torq thickeners, 600 tpd. 42. Dust-collection system. 43. Fine-coal drying system. 44. Cyclone-filter closed circuit. 45. Washing-plant addition.

46. Includes, in addition to other equipment indicated, facilities for 15,000-ton stockpile, washing tables, four Bird filters, five Raymond flash dryers and three McNally Vissac thermal dryers.

changing conditions, smaller charges are detonated (*Coal Age*, March, 1956, p 82).

At another mine, a sidewall drill was used effectively to bore overburden with limestone and sandstone layers (*Coal Age*, June, 1956, p 60). Two-level drilling with a truck-mounted rotary unit was effective in hilltop stripping of four seams in the steep West Virginia mountains (*Coal Age*, August, 1956, p 88). At another West Virginia operation, drilling was carried out on three levels with truck-mounted vertical rotary units to make a 115-ft cut (*Coal Age*, September, 1956, p 64).

To provide fast drilling of a thin tough layer of limestone between two coal seams, a mine in western Kentucky developed a special four-arm air drill (*Coal Age*, October, 1956, p 60).

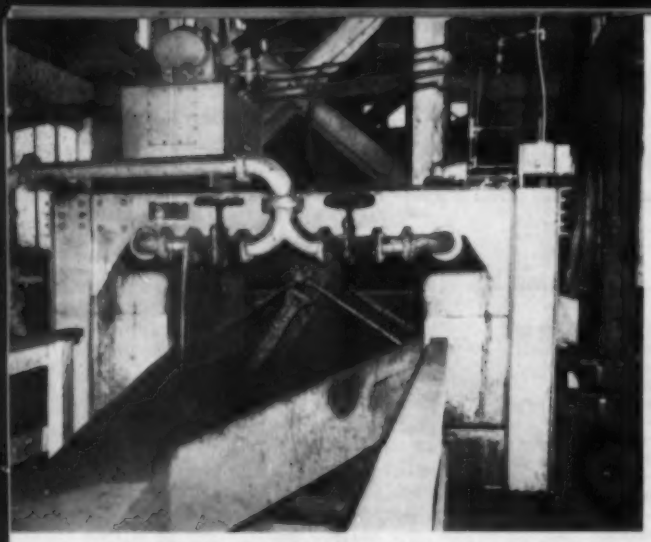
As further evidence of the unending search for better drilling methods, a new crawler-mounted rotary vertical dry-type machine was developed in Alabama to break a drilling bottleneck in tough sandstone cover. This low-cost machine features high capacity and mobility to make possible big savings in cost per foot of hole drilled (*Coal Age*, October, 1956, p 84).

There also was continuing activity in the development of better explosives and blasting agents. For example, a mixture of 90% technical-grade ammonium nitrate, 5% coal dust and 5% nitromethane has been used successfully. And further experiments are still going on with commercial-grade ammonium nitrate mixed with other ingredients. Detonating fuse along with MS delays and connectors continued to be used widely as operators sought to improve fragmentation and at the same time reduce vibration.

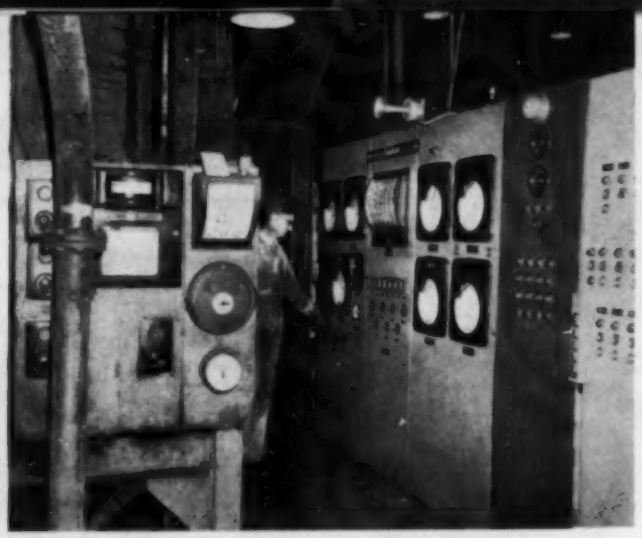
STRIPPING LIMIT:
Top Not Reached

The question of maximum dipper size has not yet been settled. Already several 70-yd shovels are being built as well as more 60-yd machines. As machines grow in size it may be necessary to develop special tools or machines to move the parts that previously had been taken off and replaced by hand.

Thus far there have been no serious problems with the 6,900-V power on the 60-yd shovel. The higher voltage is fitting into the picture as well as the 4,000-V power did in the past. Plugs, sockets and cables are performing well. Peak demand on the 60-yd unit is 6,800 to 7,000 kw. If 6,900-V equipment proves to be as trouble-free as experience indicates



HEAVY-MEDIA SYSTEMS of latest design were popular, and reports of first vacuum jigs told of successful operation.



NUMEROUS HEAT-DRYING INSTALLATIONS were made, including a new full-scale fluidized-bed unit.

thus far, higher voltages may be used in the future.

Along with the progress in larger shovels, there was continuing activity with the wheel where natural conditions permit its use. At an Illinois operation one wheel strips and spoils soft material at the rate of 10,000 cu yd in a shift (*Coal Age*, July, 1956, p 60). The wheel follows a 33-yd shovel and takes 25 to 30 ft of overburden, leaving 30 to 35 ft for the shovel. Built with a reach to move spoil well beyond the range of the shovel, the wheel eliminates any possible need for a third unit.

Wherever flexibility in stripping was highly desirable, draglines continued to be a favorite. At the smaller operations where frequent moves are necessary diesel-powered units were in the spotlight. A 10-cu yd shovel mounted on a single set of crawlers is scheduled to go in operation at a Midwest mine. Good bucket and dipper design also were given careful attention and special steels and alloys continued to be used widely.

Greater driver comfort and easier, safer operation were the leading advances in truck design. The year also was marked by the unveiling of a 70-ton coal hauler at a West Virginia operation.

Specially designed ventilating units for use on earthmoving machines are available to add materially to the health, safety and comfort of operators. Dust concentrations can be cut from 110 million particles per cu ft to less than 5 mppcf. Effective use of insulating materials keeps operators comfortable without refrigeration units.

Oil retarders marked big gains in the past year as automatic braking devices on new trucks. When a truck overspeeds the oil retarder automatically slows it by applying torsional resistance to the drive shaft. The degree of automatic braking is easily controlled by varying the flow of oil to the retarder. (*Coal Age*, October, 1956, p 66.)

Bulldozers and scrapers continued as auxiliaries in stripping and backfilling. Most companies wanted as much power as possible in bulldozers and therefore bought units with turbochargers added to the engines. The owners reported that the increased power and capacity more than offset the extra cost of the larger machine.

Motor graders, tractor shovels, bulldozers and sweepers perform a wide variety of cleanup jobs around the pits. Some were assigned regular jobs with stripping shovels while others were moved about as needed. Spoil haulage continued to large extent in anthracite stripping where spoil area was at a premium. End-dump trucks were favored for this work which usually involved hauling the material uphill on fairly steep roads.

Various sizes and types of trucks were predominant in coal haulage. In most instances tractor trailers were favored for off-highway hauling at large mines. At smaller operations or where on-highway hauling was necessary, end-dump trucks were in the majority. Emphasis continued to be placed on well-graded and well-aligned roads for high speed haulage.

AUGERING: Moves at Fast Pace

Highwall augering continued at a rapid pace in 1956, both in conjunction with stripping and as an independent operation. When used at strip mines they usually operated outside the regular mine schedule, with coal in many instances being stockpiled for loading at a convenient time. Where augers operated independently in restricted areas there was a trend toward high-capacity units that could work in a minimum of space. Output in thick seams continued to be as high as 600 tons per shift. At one operation using a 24-in auger, an average production of 150 tons per shift was maintained by using trucks for overnight storage and keeping several spare trucks on hand throughout the production shift (*Coal Age*, December, 1956, p 54).

AUXILIARY SERVICES: Improve Overall Performance

Stripping services were geared to keep machines running at peak rates. Time studies were made of stripping shovels to improve performance by changing the conditions under which they operate. The goal was to decrease cycle time and at the same time increase the bucket load factor. One midwest operator relied on electric heaters in dippers and round dipper handles in the winter months to prevent equipment delays. Better alloys and good communication systems were used more widely in an effort to improve operations. The first parallel connection of two 1,725-kva aircooled substations in a loop system in a strip mine was made in western Kentucky. This setup was selected because the substations were standard units that could be readily moved on skids and no special connectors were needed for the cables (*Coal Age*, October, 1956, p 60). The system also is designed for dual voltages so it can be used with 66,000-v power in the future.

Reclamation work and precautions against stream pollution were emphasized throughout the year. Backfilling and leveling were geared more and more to keep pace with stripping. Big bulldozers and draglines were the pacesetters in this work. The type of planting on backfilled land depended

on the type of soil and soil tests usually were made to determine the best type of planting. To cope with acid water around strip pits, one Pennsylvania operator devised equipment that feeds lime solution automatically to a point near the suction intake of a sump pump. One man services four of these systems in a shift whereas one man was formerly required at each pump.

New Anthracite Preparation Facilities in 1956*

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Black Star Coal Co.	Mores, Pa. (2)	500	Wilmot[1]
Blaschak Coal Co.	Mahanoy City, Pa. (3)	34	Deister Concentrator[2]
Roy E. Blyler	Good Springs, Pa.	8	Deister Concentrator[2]
Fisher Associates	Schuylkill Haven, Pa.	150	Wilmot[1]
Glen Alden Corp.	Audenreid, Pa. (4)	300	Wilmot[1]
Lincoln Anthracite Co.	Pine Grove, Pa. (8)	52	Deister Concentrator[2]
Minersville Coal Co.	Minersville, Pa.	8	Deister Concentrator[2]
Newkirk Mining Co.	Tamaqua, Pa. (5)	300	Wilmot[1]
Peca Bros.	Mahanoy City, Pa. (3)	28	Deister Concentrator[2]
Thomas W. Schneck	Pine Grove, Pa. (4)	36	Deister Concentrator[2]

*Includes contracts for installations of new preparation equipment in existing structures. Where more than one equipment item was installed, the number, when known, is in parentheses following the plant address.
1. Preparation plant including Wilmot-OCC heavy-media system. 2. SuperDuty Diagonal Deck coal-washing tables with, at Lincoln Anthracite, 1 Concenco revolving feed distributor. 3. Preparation plant including Wilmot-OCC heavy-media system, Hydrotator and Hydrotator classifier equipment.

Preparation

WET TABLES AND HEAVY MEDIA shared the spotlight in preparation in 1956. High interest also was shown in centrifuging, heat drying and filtering. Other cleaning units registering gains were jigs, air cleaners, and classifier-type units. More emphasis also was placed on water conservation and pollution-prevention measures. And more and more cyclones, filters and vibrators were used to recover fine coal or clarify water. Activity continued along navigable rivers as more river-loading facilities were built.

NEW PLANTS: Designed for Maximum Recovery

Continuous operation while delivering a uniform product was the goal at new preparation plants. To achieve this goal, one new plant in western Kentucky relied on two 5,000-ton raw-coal stockpiles and one 5,000-ton clean-coal stockpile. Other plant features include the use of lowering ladders in stockpiles to prevent degradation, concrete-lined sluices, bitumastic lining for stockpile chutes and an unusual ductless hot-air heating system (*Coal Age*, October, 1956, p 60).

At another new plant in Pennsylvania, the company boosted the overall quality and increased the yield of metallurgical coal by 25%. Raw coal may be distributed to either of four bins and later fed separately or in a blend to the cleaning plant. Plant features include a large wash box incorporating many new design features, such as, dual washing beds, dual air chambers, two middlings elevators, no hutch screws and six individually controlled refuse draws. In the fine-coal cleaning section up to 2 hr of delay time has been eliminated by exercising close control over the filter circuit and thus preventing trouble with 28Mx0 clogging the drier-feeder conveyor or surge bins (*Coal Age*, October, 1956, p 78).

One anthracite company simplified its cleaning by feeding a wide range of sizes to a single heavy-media vessel. Replacing several classifier-type cleaners, the new-type dense-media unit made possible the simplification of plant circuits by eliminating raw-coal shakers and chutes and screens for transporting coal from the separate cleaners and in dewatering service. Labor requirements also were reduced sharply (*Coal Age*, October, 1956, p 90).

The first fluidized-bed fine-coal drier went into service in southern Indiana. Coal with 11% moisture is fed to the reactor at the rate of 85 tph and comes out with an average of 2% surface moisture.

Longer life and reduced operating and maintenance costs were the reasons for specifying special steels at a metallurgical plant in eastern Kentucky. As an example, stainless-steel liners are used in flumes, chutes, screen surfaces and the stacks of heat driers. Austenite non-magnetic steel is used in the housing and support structure of the tramp-iron magnet to eliminate the possibility of having the magnet misplaced through its attraction to the structure. Other outstanding plant features include bowl desiltors to remove up to 90% of the minus 200M slimes from the table feed and thereby promote better dewatering by the solid-bowl centrifuges, and a radial slurry screen handling the underflow of the clean coal desanding screen to recover plus 28M coal.

CLEANING FACILITIES: Wide Range Selected

There was a wide range in the variety of cleaning facilities installed in the past year. Assorted types of heavy-media systems, jigs, washers and upward current classifiers were added. Since total cleaning continued to be practiced at an increasing number of plants, more wet and dry tables were installed to handle the fines. Attention also was directed toward boosting total recovery by crushing and recirculating middlings.

Primary crushers or rotary breakers in conjunction with scalping screens were installed at plants where total cleaning was practiced. Secondary crushers also saw more service to reduce middlings for rewashing as plants were designed to recover as much coal as possible. Wet screening of raw coal became more popular where fines were eliminated in the coarse-coal cleaning system.

To recover the extremely fine coal under 10 mesh, there were more cyclones, thickeners, filters and vibrators put into service. Thickeners and filters also were used in the refuse circuit to conserve water and prevent the discharge of solids to streams. Some companies added flocculants to thickeners to speed settling of solids and thereby cut clarification time. As a result water was conserved and clay staining and stream pollution were reduced.

Both heat and mechanical drying advanced during the year. Centrifugal machines were used alone or in conjunction with heat equipment to remove water from sizes up to ⅜ in. Heat driers were used for material up to 1¼ in. One company in southern Indiana solved the dust problem with heat driers by building a 175-ft common smokestack for five driers.

To control dust within the plant, particularly around crushers and vibrators, one company installed water sprays at strategic locations. To provide better wetting of the dust, a wetting agent is used with the spray.

AUXILIARIES: Reduce Down Time

Special steels and alloys continued to be used at points where corrosion- and abrasion-resistance was needed. Plastic and rubber pipe were used to carry slurries or acid water.

Plant controls continued to be installed in separate centers and frequently in dusttight cabinets. Communication throughout plants was simplified by the use of loudspeaker systems and there was talk of television cameras at central units to permit observation from a central point.

BETTER ILLUMINATION at the face, offering increased safety for underground workers, was a 1956 development.

Safety in 1956

A level year on an industry-wide basis, but with indications that new, larger gains in safety may be made in the years immediately ahead.

SAFETY PERFORMANCE in 1956, as expressed by the rate of fatalities per million tons for anthracite and bituminous combined, showed no improvement over 1955, as the subject-to-revision Bureau of Mines figures in the accompanying table demonstrate. Total fatalities were higher than in 1955, but the big safety story of 1956 may lie in the fact that the industry could hold the rate level while faced with the other problem of substantially increasing production to meet demands for coal. The effort put forth in holding the rate level is commendable, even though results were disappointing.

In similar manner, the rate of fatalities per million man-hours was less favorable last year than in 1955. The lesson in the record of 1956 is that any further improvement is going to be harder to achieve, and different approaches to the problem may be the need of the day. In this respect, it is noteworthy that in 1956 leaders in safety-promotion efforts placed more and more emphasis on the importance of proper employee attitudes as an indispensable factor in improving safety.

The manner in which the yearly statistics seem to revolve about a point does not indicate any lack of safety effort or interest. The virility of industry, regional, company and local programs give credence to the belief that coal may be on the threshhold of new, larger safety gains in the years immediately ahead. Time will tell, of course, but the spirit is evident in activities such as the following:

The industry-wide campaign against roof-fall accidents did not bring about the substantial reductions that coal had hoped to see, but it did focus attention on the problem from all quarters. For this reason alone the campaign may be regarded as a success. Research has been spurred in efforts to define roof action in terms of mathematics, to design a shield that will protect face workers and to perhaps find some adhesive (and equipment and methods for applying it) that will bind roof into a competent beam ahead of the mining process.

Fruits of research offered distinct safety advantages in other respects. For example, flame-resistant conveyor belting now is available, and the Bureau of Mines has launched a program having as its goal finding a nonflammable hydraulic fluid. Improved methane detectors are on the market or in late stages of development, with the problem of remote detection and indication receiving the attention it merits in view of the rapid advances made possible by modern mining machines.

Regional and state reports from several areas tell of safety performance in 1956 running far ahead of the national averages. Indiana, for example, continued to improve its performance through cooperative action of operators, the union, the insurance carrier and inspection agencies. The rate of occurrence of compensable accidents was reduced to levels that only a few years ago would have been considered improbable, if not impossible.

Last October was the third fatality-free month of 1956 in the mines of Illinois, reflecting the adoption of a new mining code in 1953 and resolution within the industry to improve safety.

Mines in the Pennsylvania bituminous region maintained their laudable defense against roof-fall fatalities and injuries. Emphasis and effort again were the keys in bringing about this improvement. These records clearly show that improvement is possible; the irreducible minimum for the entire in-

U. S. Coal-Mine Fatalities in 1956 and 1955[1]

Cause and Location	Bituminous Fatalities 1956	Bituminous Fatalities 1955	Bituminous Rate[2] 1956	Bituminous Rate[2] 1955	Anthracite Fatalities 1956	Anthracite Fatalities 1955	Anthracite Rate[2] 1956	Anthracite Rate[2] 1955	Total Fatalities 1956	Total Fatalities 1955	Total Rate[2] 1956	Total Rate[2] 1955
Falls of roof or face	213	194	0.43	0.41	31	34	1.08	1.30	244	228	0.46	0.46
Haulage	71	60	0.14	0.13	6	6	0.21	0.23	77	66	0.15	0.13
Explosions: Local	5	2	0.01	....[3]	4	2	0.14	0.08	9	4	0.02	0.01
Major	..	..	....	....	..	..	....	....	..	..	....	....
Explosives	9	10	0.02	0.02	1	2	0.03	0.08	10	12	0.02	0.02
Electricity	13	15	0.03	0.03	2	..	0.07	....	15	15	0.03	0.03
Machinery	17	14	0.03	0.03	..	..	....	....	17	14	0.03	0.03
Mine Fires	2	..	....[3]	....	..	..	....	....	2	..	....[3]	....
All other	11	5	0.02	0.01	4	5	0.14	0.19	15	10	0.03	0.02
Total Underground	341	300	0.68	0.64	48	49	1.68	1.87	389	349	0.74	0.70
Surface: Haulage	11	17	0.02	0.04	1	2	0.03	0.08	12	19	0.02	0.04
Electricity	4	5	0.01	0.01	..	1	....	0.04	4	6	0.01	0.01
Machinery	5	5	0.01	0.01	1	..	0.03	....	6	5	0.01	0.01
All other	3	6	0.01	0.01	2	5	0.07	0.19	5	11	0.01	0.02
Total surface	23	33	0.05	0.07	4	8	0.14	0.31	27	41	0.05	0.08
Strip mines: Haulage	9	7	0.02	0.01	1	..	0.03	....	10	7	0.02	0.01
Electricity	2	..	....[3]	....	..	..	....	....	2	..	....[3]	....
Machinery	2	9	....[3]	0.02	1	2	0.03	0.08	3	11	0.01	0.02
All other	12	8	0.02	0.02	1	1	0.03	0.04	13	9	0.02	0.02
Total strip	25	24	0.05	0.05	3	3	0.10	0.11	28	27	0.05	0.05
Grand Total	389	357	0.78	0.76	55	60	1.92	2.29	444	417	0.84	0.84

[1]All figures are subject to revision. [2]Fatalities per million short tons. [3]Less than 0.005 percent.

dustry still is somewhere below present performance.

Excellent progress at the company level also was achieved in some instances. At the mines of one large company, where three men had lost their lives in roof-fall accidents in 1955, the 1956 record showed no fatalities and no lost-time injuries from this cause. Even more striking, the annual total of lost-time accidents from all causes now closely matches the monthly toll of only a few years ago. The sincere, continuous interest of management in safety matters undergirds this company's program. The active participation of the men is solicited, and the supervisors accept safety instruction as one of the major responsibilities of their jobs.

A Pennsylvania mine shows the way, speaking of long-range accident-prevention measures, to set up a fire-control system. Design of the system provides sufficient capacity and head to insure an effective quantity of water at useful pressure at the innermost workings. Auxiliary equipment includes mobile fire trucks with a self-contained water supply and booster pumps and the necessary tools for constructing stoppings and curtains. Backing up this physical equipment is a trained organization of mine-rescue men and supervisors familiar with the techniques of fighting mine fires.

Safety progress thus is being made at the company level. More of this progress in more companies, sparked by top management, will bring about in the next few years equal or greater safety gains than those achieved in the past decade, say.

There was one jarring note in the 1956 record which company supervisors should take as a lesson. Two men died at an auger mine from asphyxiation in one of the auger holes. This is a new hazard, and defenses against recurrences at other auger mines should be set up now.

The working force and officials at no mine in the land were forced to suffer through a major disaster in 1956, and at this writing no such catastrophe has occurred in the nation in the past 26 mo. No one can be certain of the fact, but indications are that real progress is being made in eliminating or alleviating the conditions which trigger disasters. There have been mine fires, however, any one of which might have been a seed of destruction. Eliminating the possibilities for ignitions is the only solution. The steps are improved dust control, better ventilation and safety-based power distribution.

On the local scene there was continuing interest in the organization of Holmes Safety Association chapters and councils. Accident-prevention training was carried into new areas, increasing the number of mines reporting 100% participation.

Appointments also made news. M. J. Ankeny, formerly safety director, Bituminous Coal Operators' Association, was appointed to the position of director, USBM. One of Mr. Ankeny's earliest moves was to set up procedures for publishing in the *Federal Register* all interpretations of the federal coal-mine safety laws. George C. Trevorrow, formerly a Pennsylvania coal-company officer, succeeded Mr. Ankeny at BCOA. Charles Ferguson, safety director, United Mine Workers of America, moved up to the general chairmanship of the Coal Mining Section of the National Safety Council. He is the first representative of mine labor to hold the position.

Manufacturers of mine safety equipment continued to improve their products and to offer new ones to the industry. The previously mentioned fire trucks are one example. Others are improved wet rockdusting machines and at least three types of ground protective devices to protect men against the hazard of electric shock from frame grounds in face machines.

Late in the year, the Bureau of Mines approved two types of fluorescent mine lighting fixtures and associated equipment. Reports from two mines, where experiments with modern lighting systems were conducted, told of major safety advantages accruing from better lighting. The coming year no doubt will see other mines adopting modern lighting.

1956 Sales of Mining Equipment

Mechanical loading and mining capacity up. Bituminous mechanical-cleaning capacity down.

By W. H. YOUNG, Chief, Bituminous Coal and Lignite Section, and R. L. ANDERSON, Supervisory Commodity-Industry Analyst, U. S. Bureau of Mines

UNDERGROUND mechanical-loading equipment shipped to coal mines in the United States had capacity 44% larger in 1956 than in 1955. The capacity of mechanical cleaning equipment sold for use at bituminous mines was 6% less than in 1955. Shipments of coal-recovery augers, shuttle cars and "mother" conveyors for use in coal mines in the United States increased in 1956 from 1955. Bridge-conveyor shipments in 1956 are listed separately for the first time.

This survey was made possible by the cooperation of all known manufacturers of mechanical cleaning equipment for bituminous mines and of mechanical loading and supplementary haulage equipment and coal-recovery augers for use in all coal mines in the United States. Data from various trade journals were also utilized.

Mechanical loading units, coal-recovery augers and supplementary haulage equipment sales in 1956, as in previous years, represent shipments made during the year. Of the total capacity of mechanical cleaning equipment sold in 1956, 34% was placed in operation during that year; the remainder (66%) will be installed later.

Mechanical Loading and Mining

Estimated bituminous coal and lignite mechanically loaded in underground mines increased from 302 million tons in 1955 to 315 million tons in 1956, or 4%. Estimated production at strip mines increased from 110 million tons to 124, or 13%, and auger production increased from 6 to 7 million tons.

Table I shows bituminous and lignite production by methods of mining and mechanical cleaning for 1954-56,

Table I—United States Bituminous and Lignite Production By Methods of Mining and Mechanical Cleaning

	1954		1955[a]		1956[a]	
	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total
Hand-loaded underground	46,377	11.8	52,000	11.1	54,000	10.8
Mechanically loaded underground	243,735	62.0	302,000	64.2	315,000	63.0
Mined at auger mines	4,460	1.1	6,000	1.3	7,000	1.4
Mined by stripping	98,134	25.1	110,000	23.4	124,000	24.8
Total production	391,706	100.0	470,000	100.0	500,000	100.0
Mechanically cleaned	232,764	59.4	282,000	60.0	305,000	61.0

[a]Preliminary.

Table II—Underground Bituminous and Lignite Production by Methods of Loading

	1954		1955[1]		1956[1]	
	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total
Mobile loading machines:						
Loading direct into mine cars	41,585	14.4	.....[2]	....[2]	.....[2]	....[2]
Loading onto conveyors	11,318	3.9	.....[2]	....[2]	.....[2]	....[2]
Loading into shuttle cars	153,463	53.1	.....[2]	....[2]	.....[2]	....[2]
Continuous mining machines	16,336	5.7	.....[2]	....[2]	.....[2]	....[2]
Scrapers	417	.1	.....[2]	....[2]	.....[2]	....[2]
Conveyors equipped with duckbills or other self-loading heads	4,347	1.5	.....[2]	....[2]	.....[2]	....[2]
Hand-loaded conveyors	15,269	5.3	.....[2]	....[2]	.....[2]	....[2]
Total mechanically loaded	243,735	84.0	302,000	85.3	315,000	85.4
Hand-loaded into mine cars	46,377	16.0	52,000	14.7	54,000	14.6
Total underground production	289,112	100.0	354,000	100.0	369,000	100.0

[1]Preliminary. [2]Included with "Total mechanically loaded."

Table III—Mechanical Loading and Mining Equipment Sold For Use in Coal Mines, as Reported by Manufacturers

	1951	1952	1953	1954	1955	1956	Change from 1955 (Percent)
Bituminous-coal and lignite mines:							
Mobile loading machines	287	206	180	92	120	254	+111.7
Continuous mining machines			67	101	109	154	+ 41.3
Coal-recovery augers	...[1]	...[1]	57	55	65	89	+ 36.9
Scrapers[2]	4	8	11	5	...	...	.....
Shuttle cars	524	428	437	242	348	536	+ 54.0
"Mother" conveyors[3]	114	67	58	19	78	137	+ 75.6
Room or transfer conveyors[4]	297	155	87	61	143	232	+ 62.2
Bridge conveyors	...[5]	...[5]	...[5]	...[5]	...[5]	128	.....[5]
Anthracite mines (Pennsylvania):							
Mobile loading machines	...	...	1	17	1	1	.....
Continuous mining machines	...	...	...	1	...	...	.....
Coal-recovery augers	...[1]	...[1]	...	...	1	...	−100.0
Scrapers[2]	8	5	3	...	2	...	−100.0
Shuttle cars	...	...	...	14	8	2	− 75.0
"Mother" conveyors[3]	...	...	...	...	3	...	−100.0
Room or transfer conveyors[4]	34	34	16	24	7	19	+171.4
Number of manufacturers reporting	21	22	23	23	22	22	.....

[1]Not available. Total number of coal-recovery augers sold 1946-52, inclusive, was 271.
[2]Reported as scrapers or scraper haulers and hoists.
[3]Includes all haulage conveyors with a capacity over 500 ft, except main slope conveyors.
[4]Includes all haulage conveyors with a capacity of 100 ft to 500 ft, except main slope conveyors.
[5]Not available.

Table IV—Sales of Mechanical Loading Equipment in 1955 and 1956 Compared With Machines in Use in Preceding Years

	Number Machines Operators Reported in Use						Sales	
	1949	1950	1951	1952	1953	1954	1955	1956
Bituminous and Lignite:								
Mobile loading machines	4,205	4,318	4,410	4,083	3,585	4,292	120	254
Continuous mining machines				152	219	320	109	154
Scrapers	46	39	22	19	29	47	..	..
Conveyors equipped with duckbills or other self-loading heads	1,483	1,329	1,242	1,049	849	618	..[1]	..[1]
Hand-loaded room conveyors, number of units	4,312	4,434	3,904	3,569	2,994	2,205	143[1]	232[1]
Anthracite Mines (Pennsylvania):								
Mobile loading machines	27	30	43	54	39	68	1	1
Continuous mining machines	....	....	....	....	....	....	..	..
Scrapers	589	556	528	456	469	359	2	..
Hand-loaded room conveyors, number of units[2]	3,618	3,460	3,282	3,232	2,784	2,277	7	19

[1]Sales of conveyors equipped with duckbills or other self-loading heads are included with hand-loaded room conveyors.

[2]Includes pit-car loaders and conveyors equipped with duckbills or other self-loading heads.

Table V—Mechanical Loading and Mining Equipment in Use in 1954, With 1955-56 Sales

	Mobile Loading Machines			Continuous Mining Machines			Scrapers[1]	Room Conveyors[2]			Coal-Recovery Augers		
	In Use in 1954	Sales		In Use in 1954	Sales		In Use in 1954	In Use in 1954	Sales		In Use in 1954	Sales	
		1955	1956		1955	1956			1955	1956		1955	1956
Bituminous and Lignite:													
Alabama	136	2	22	10	..	1	..	118	4	6	..	..	..
Alaska	11	..	..	2	..	..	14	..	..	..	..	..	..
Arkansas	..	..	..	..	..	..	..	38	..	..	..	..	..
Colorado	57	..	1	4	..	..	2	174	..	..	..	1	..
Illinois	272	1	1	22	7	9	..	15	..	..	..	1	2
Indiana	85	1	3	4	..	1	..	..	..	..	..	..	..
Iowa	5	..	..	..	..	..	..	1	..	..	..	..	..
Kentucky	585	27	33	14	6	5	..	315	28	32	17	11	15
Maryland	2	..	..	..	..	..	..	8	..	..	..	..	..
Montana, bituminous	17	..	..	..	..	..	..	11	..	..	..	..	..
New Mexico	16	..	..	..	..	..	..	1	..	..	..	..	..
North Dakota and Montana, lignite	3	..	..	..	..	..	..	..	..	..	..	..	..
Ohio	173	..	3	12	4	8	1	58	7	5	32	5	12
Oklahoma	7	..	..	..	..	..	..	117	..	5	..	..	..
Pennsylvania	964	17	48	153	50	68	11	643	12	30	25	8	10
Tennessee	31	3	..	..	..	1	..	39	..	..	5	..	2
Utah	146	3	3	6	5	2	..	40	..	..	..	..	..
Virginia	168	14	15	5	9	3	1	105	17	6	8	6	7
Washington	4	..	..	7	1	..	11	84	..	..	..	..	..
West Virginia	1,565	52	124	79	27	56	3	868	75	148	90	33	41
Wyoming	41	..	1	2	..	..	4	188	..	..	..	..	..
Total	4,292	120	254	320	109	154	47	2,823	143	232	177	65	89
Anthracite mines (Pennsylvania)	68	1	1	..	..	..	359	2,277[3]	7	19	..	1	..
Grand total	4,360	121	255	320	109	154	406	5,100	150	251	177	66	89

[1]Sales of 2 scrapers were made to Pennsylvania anthracite mines in 1955 and no scraper sales were reported in 1956.

[2]Includes hand-loaded conveyors and conveyors equipped with duckbills or other self-loading heads.

[3]Also includes pit-car loaders.

inclusive. The percentage of total output mechanically loaded and cleaned continues to increase. During 1956, approximately 89% of the total output was mechanically loaded at underground mines, loaded by power shovels at strip mines, or mined by augers at strip mines.

Underground production of bituminous coal and lignite, by methods of loading is listed in Table II. The preliminary figures for 1956 show little change from the previous year in the percentage of the underground output handled mechanically.

Auger Mining—The use of augers for coal recovery along highwalls in strip mines began about 1945, but separate data on number in use and auger tonnage were first collected for 1952.

Reports from four auger manufacturers show that 89 were shipped in 1956 compared with 66 in 1955, an increase of 35%. All augers shipped in 1956 were for use along highwalls

Table VI—Units of Conveying Equipment Sold for Use in Coal Mines, 1955-56, by States

	Bridge Conveyors[1]	Shuttle Cars		"Mother" Conveyors[2]	
	1956	1955	1956	1955	1956
Bituminous and Lignite:					
Alabama	6	17	47	3	7
Colorado	..	2	4	..	1
Illinois	4	12	11	1	12
Indiana	..	3	8	1	1
Kentucky	30	45	32	8	6
Ohio	10	..	9	7	9
Oklahoma	..	..	2	..	..
Pennsylvania	12	96	130	27	36
Tennessee	..	2	4	..	1
Utah	..	13	8	2	4
Virginia	3	31	40	6	7
West Virginia	63	127	239	23	53
Wyoming	....	..	2	..	..
Total	128	348	536	78	137
Anthracite mines (Pennsylvania)	..	8	2	3	..
Grand total	128	356	538	81	137

[1]Data not available for 1955. [2]Includes all haulage conveyors with capacity over 500 ft., except main slope conveyors.

Table VII—Bituminous Coal Mechanically Cleaned in 1954 Compared With Sales of Mechanical Cleaning Equipment in 1955-56

State	1954 Number of Plants in Operation	1954 Net Tons of Cleaned Coal	1954 Output Mechanically Cleaned (Percent)	Annual capacity of equipment sold (net tons)[1] 1955	1956
Alabama	49	9,173,047	89.2	....[2]	398,000
Alaska	2	221,453	33.2	....	....
Arkansas	...	.....[3]	[3]	....	....
Colorado	4	1,073,254[3]	31.8[3]	....	....
Illinois	66	35,116,921	83.7	2,757,000	1,953,000
Indiana	25	10,762,266	80.3	....	....[2]
Kansas	5	1,229,962	89.6	....	....
Kentucky	82	32,878,696	57.7	4,739,000	4,215,000
Missouri	8	2,299,225	91.5	....	....
Montana	3	12,757	.9	....	....
New Mexico	1	73,272	59.5	....	....
Ohio	24	13,443,275	41.4	....	....[2]
Oklahoma	4	685,426	35.8	....	....
Pennsylvania	96	44,214,865	61.4	1,109,000	1,894,000
Tennessee	7	472,119	7.3	....	....
Utah	4	2,073,706	41.4	....	....[2]
Virginia	29	8,460,496	51.6	1,413,000	....[2]
Washington	10	592,612	95.7	....[2]	....
West Virginia	193	69,969,941	60.3	8,294,000	7,419,000
Wyoming	1	10,730	.4	....	....
Undistributed	...	.....	....	843,000	2,059,000
Total	613	232,764,023	59.4	19,155,000	17,938,000

[1]Based on average days mines were active in 1955 and 7.0 hr per day. [2]Included in "Undistributed." [3]Arkansas included with Colorado.

at strip mines. Table III shows coal-recovery auger shipments in 1953, 1954, 1955 and 1956, and Table V, the number in use in 1954 and shipments in 1955-56 by states.

Types of Units Sold—Table III lists the units of mechanical loading and mining equipment shipped to coal mines in the United States for the period 1951-56, inclusive. Shipments of all types of mechanical loading equipment except scraper loaders increased in 1956; also shipments of shuttle cars, "mother" conveyors and room or transfer conveyors.

Types of Mechanical - Loading Equipment Sold Compared With Units In Use—Table IV shows the trend in demand for various types of mechanical-loading equipment. Mobile loading machines in use reached the maximum in 1951 at bituminous and lignite mines and in 1954 at Pennsylvania anthracite mines. Shipments of mobile loading machines in 1956 were 6% of the number in use in 1954 at bituminous, lignite and Pennsylvania anthracite mines.

Table V shows the number of mechanical loading units and coal-recovery augers shipped to various states in 1955 and 1956 compared with the number in use in 1954 as reported by mine operators. Sales of room conveyors as listed in Table V are not exactly comparable with the number in use. To avoid duplication in tonnage mechanically loaded, each mine operator was instructed to report "hand-loaded" and "self-loading" conveyor tonnage only. Therefore, room conveyors loaded by mobile loaders are not included with "Room conveyors in use in 1953." Shipments of coal-recovery augers in 1955 and 1956 combined were 88% of the total number in use in 1954.

Haulage Equipment

Shuttle Cars—Sales of shuttle cars increased from 356 in 1955 to 538 in 1956. Details of shipments to various states in 1955 and 1956 are given in Table VI.

"Mother" Conveyors—For the purpose of this study a "mother" conveyor is defined as a sectional, extensible, power-driven conveying unit that can handle over 500 ft of conveyor. Main-slope conveyors are excluded. Table III lists sales for 1951-56, inclusive, and Table VI shows shipments by states in 1955 and 1956.

Bridge Conveyors—Sales of bridge conveyors were first reported in 1950 and have been included with face conveyors in previous reports. During recent years sales of face conveyors have been decreasing while bridge conveyors have been increasing. In 1956 there were 15 face conveyors sold and 128 bridge conveyors. Bridge-conveyor shipments by states are listed in Table VI; face-conveyor shipments are excluded.

Mechanical Cleaning

Reports from 18 manufacturers of bituminous-coal-cleaning equipment show that the total capacity of 1956 sales was 11,810 net tons of clean coal per hour compared with 12,610 tons in 1955. However, the annual capacity of 1956 sales, based on average days mines were active in 1955, decreased 6% from 1955 sales (Table VII). Sales in 1956, by type of equipment, in terms of capacity, show that jigs ranked first, followed by dense medium and wet tables. The capacity of all types of equipment sold in 1956 for cleaning bituminous by wet methods was equivalent to 8% of the bituminous coal cleaned by wet methods in 1954, and the capacity of pneumatic equipment sold in 1956 was 8% of the tonnage pneumatically cleaned in 1954. Approximately 35% of the total capacity of cleaning equipment sold in 1956 was for additions to present installations and the remainder, 65%, comprised new plants.

Table VII gives data on bituminous coal cleaned in 1954, by states, and the annual capacity of equipment sold in 1955 and 1956.

Cold Weather Treatment for Coal

Truax-Traer sprays both the coal and the cars with oil at Pyramid preparation plant, Pinckneyville, Ill., to make it easier to unload cars at destination and to preserve the "as received" values in the coal.

By LANING DRESS,
Preparation Director
Truax-Traer Coal Co.,
Chicago, Ill.

AT PYRAMID PREPARATION PLANT, during the winter of 1955-56, an application of light oil for antifreeze treatment was used on washed coal in lieu of the liquid calcium chloride formerly used. The oil also was used to spray inside the railroad cars. Specifications of the oil are as follows:

Source: Standard Oil Co., Woodriver, Ill.

Name: WR 663½
A. P. I. gravity: 15.5
Specific gravity at 60 F: 0.9626
Pounds per gallon: 8.026
BTU per pound: 18,815
Pour point: 20 F
Viscosity: 80 sec at 100 F
Cost per gallon (delivered to Pyramid storage tanks): $0.0991

APPLICATION TO COAL

Our method of application is to pump the oil through a header line, maintaining a pressure of 160-200 psi. This is a loop line with a pressure-relief valve located at the return end near the storage tank. We have several points of application throughout the plant to spray the various sizes of coal, and branch lines are run to various tracks for spraying inside the railroad cars.

We use bronze spray nozzles that provide fine, cone-shaped sprays, the nozzles having variable-sized orifices so that the amount of oil applied can be controlled at each application point.

The amount of oil applied depends upon the size of coal being treated. The following table is a guide:

Size	Qt per ton
¼x0 centrifuged carbon ..	6
⅜x28M carbon	5
⅞x⅜ nut	4
1¼x⅞ nut	3
1¼x⅞ crushed coal from 4x2 or 2x1¼ ...	2

When a combination of these sizes is loaded, we decrease the amount on the coarse sizes. For example, when 1¼x28M screenings are being treated, we apply 6 qt per ton to the ⅜x28M but only 2 qt per ton to the ⅞x⅜ and 1 qt per ton to the 1¼x⅞ fraction. This makes a total of 3.4 qt per ton on the 1¼x28M screenings at a cost of 0.084c per ton.

We noticed last winter that the flow characteristics of the coal were greatly improved. For example, chutes that formerly required cleaning of fine packed coal once or twice a shift no longer needed to be cleaned as a result of the oil additive.

RAILROAD CAR SPRAYING

We apply a light coating of oil to the inside of every railroad car loaded with coal below 1¼ in. Average quantities for properly loading the insides of cars are 6 gal for a 50-ton hopper and 7.6 gal for a 70-ton hopper at a cost of approximately 1c per ton.

Spraying the insides of the cars is the largest single factor contributing to easier unloading in freezing weather. The oil coating helps seal the pitted steel plates that have a tendency to retain moisture. Oil-treated cars also shed water at a higher rate than untreated cars.

The setup is similar to that for spraying coal. The method can be used on any number of tracks, and one man can do the job. It takes about 20 sec to treat the inside of a car.

An improper oil may drain from the cars to coat the rails, thus limiting traction. But the proper oil will stick when it strikes the steel plates of a car. It is applied at a pressure of from 180 to 200 psi. We use a dropline to the oiling platform made of oil-resistant hose with a short aluminum pipe at the end. The pipe is fitted with a quick-opening valve and is bent at 45 deg for easier control of the spray. The nozzle is attached to the end of the pipe. Cars should not be oiled in the 18- to 24-in space near the top.

OIL VS CALCIUM CHLORIDE

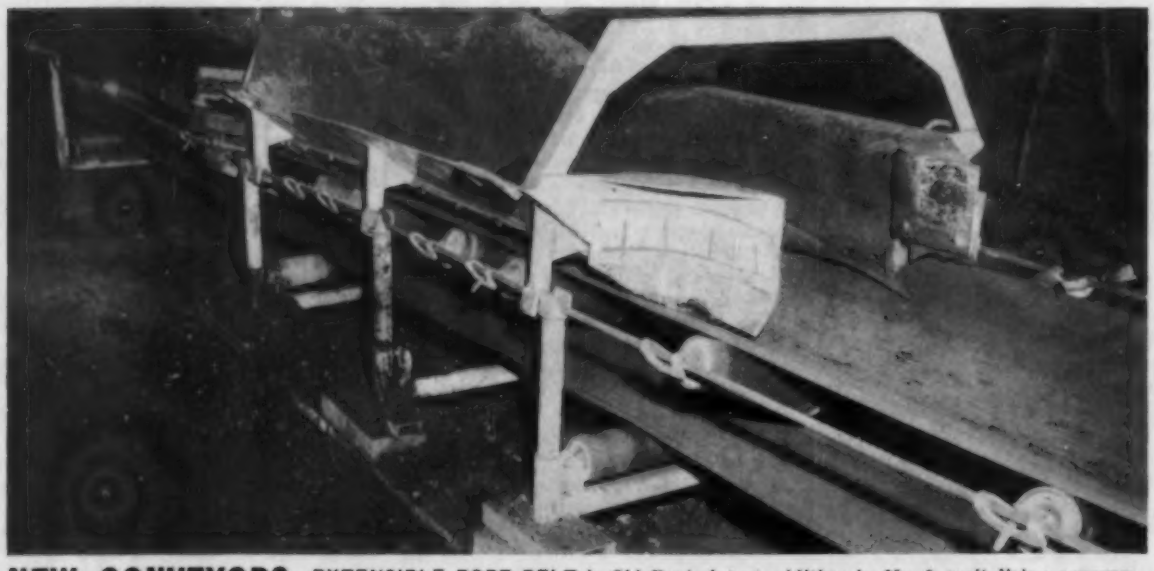
We have studied the unloading of many cars of washed coal, both oil-treated and calcium chloride-treated, in subfreezing temperatures. (Usual application of calcium chloride is 2 gal per ton at 1.30 sp gr.) The condition most frequently found was that cars treated with liquid calcium chloride would be frozen harder than oil-treated cars. In both cases, however, a little heat was needed underneath the car to thaw the coal in the car pockets. After calcium chloride-treated cars were heated, a heavy concentration of water would run out as the car doors were opened. This was not the case with oil-treated cars.

As previously mentioned, the usual application of calcium-chloride solution was 2 gal per ton. This is approximately 100 gal of moisture added to a 50-ton car of coal, or a 0.80% increase in moisture and a reduced "as received" BTU value. The use of oil adds BTU's, since each pound of WR-663½ oil provides 18,815 BTU. Furthermore, we have eliminated corrosion problems on concrete surfaces, buildings and machinery, which we had while using the calcium chloride solution.

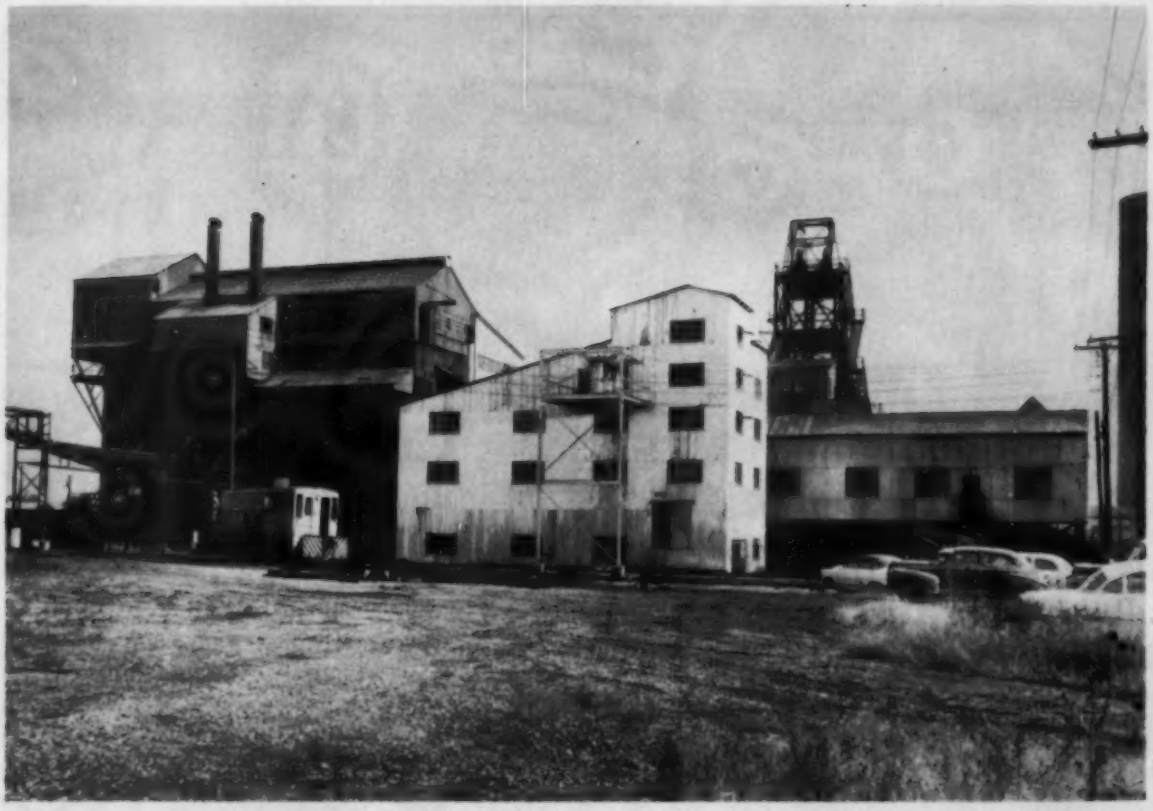
We are fully aware that we have not solved the problem of frozen coal completely, but we have made progress in facilitating cold-weather unloading of cars.

CONTINUOUS MINING **BORING MACHINE** makes possible increased recovery as well as high tonnage per crew. Unit bores oval opening 13 ft 2 in by 7 ft, leaving top coal for support.

Old Ben No. 9 Gets New Look:



NEW CONVEYORS **EXTENSIBLE ROPE BELT** is Old Ben's latest addition in No. 9 revitalizing program. Unit works in entries, rooms and pillars and has carried coal at the rate of 557 tph.



BETTER PREPARATION CLEANING FACILITIES include new dense-media section (center), jigs, air cleaners, crushers, screens and storage bins in other buildings. Capacity is 900 tph.

Plans for Long, Productive Life

By A. E. FLOWERS
Associate Editor, COAL AGE

THE LATEST in underground mining and face-haulage equipment coupled with revamped preparation facilities has given a new look to Old Ben's No. 9 mine. Boring-type continuous miners not only are producing high tonnage per crew but also are boosting percentage of recovery. Preparation facilities, including a new dense-media section, jigs, cyclones and pneumatic tables are now geared to upgrade coal to the best possible quality.

The modernization program, going on since 1952, reached its climax in 1956. In that year a dense-media section was added to the preparation plant, and more continuous miners, a rope panel belt and Ropex extensible belt were added underground.

First-aid, mine-rescue and meetings buildings received the last coats of paint and were readied for use. The plant is now in a position to mine and prepare 6,500 tons of coal per shift. Reserves blocked out for No. 9 will give it a 50-yr life.

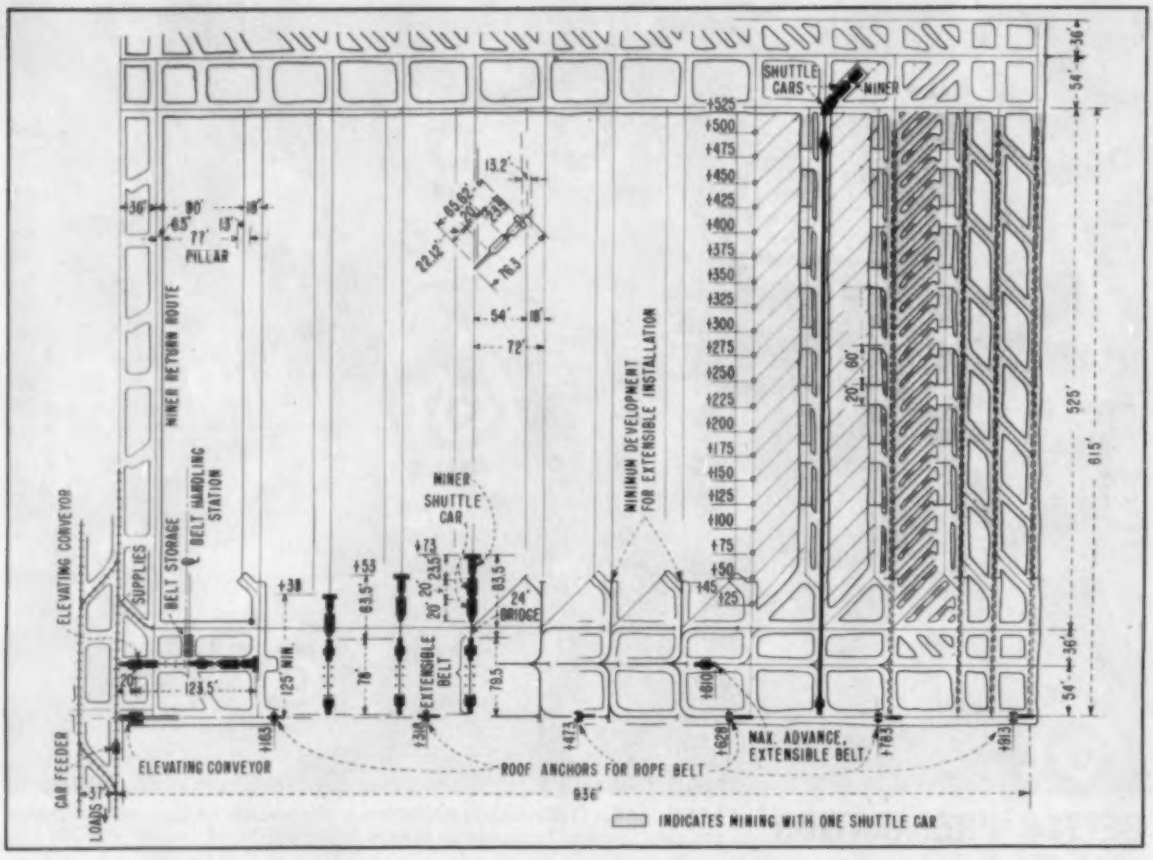
Continuous miners are the backbone of the modernization program. Old Ben No. 9 has six Goodman 500's working two shifts per day. Each of these machines produces an average of 600 tons of clean coal per shift under all types of conditions. Experience has shown that 40.2% more tonnage per shift is produced in rooms and pillars than in solid work. This was pinpointed after studying two units for over 9 mo, one in headings and the other in pillar-retreat work. Peak production in headings has been 700 tons per shift. In pillar retreat it has been 1,180 tons.

WHAT THE CONDITIONS ARE

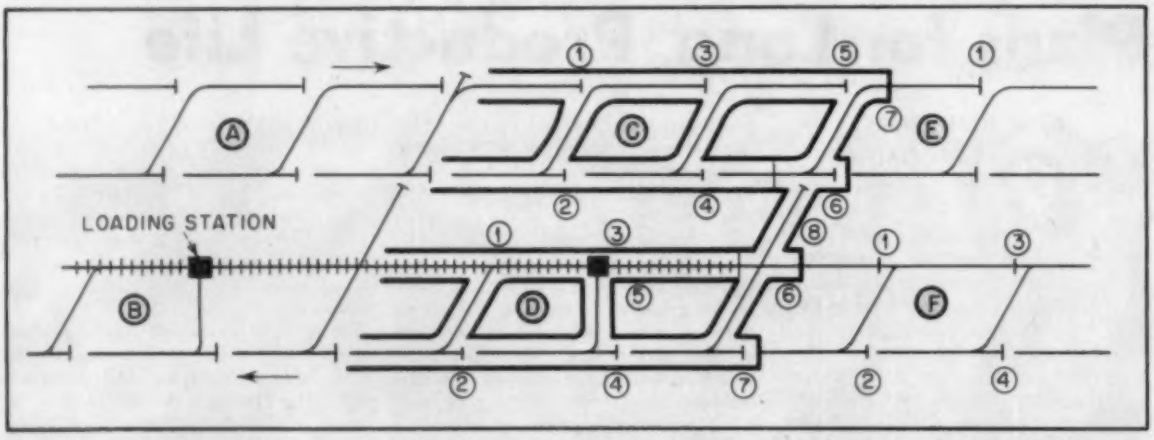
Old Ben No. 9 produces coal from the Illinois No. 6 seam in Franklin County, Ill. The coal bed dips 1% to the northeast and averages 9 ft in thickness. The seam is marked by a ½- to 1¼-in layer of "blue band" about one-fifth of the seam height above the floor. This impurity is a hard gray shale with vitrain stringers. There is also a 4- to 6-in layer of bony coal at the base of the seam. This is somewhat of a handicap for conventional undercutting.

A layer of fairly soft clay underlies the coal. This material ranges from 1 to 4 ft in thickness and averages 2 ft. The clay is underlaid by 4 ft of hard conglomerate. At times the softer clay heaves.

Cover on the coal averages 470 ft, of which 400 ft is rock and 70 ft glacial till. The immediate roof is moderately firm gray shale. Other strata consist mostly of shales. Two 4- to 5-ft limestone beds 20 ft apart and about 100 ft above the No. 6 coal serve as "markers" for the No. 6 in prospect drilling. Occasionally there is a third limestone bed 3 to 30 ft above the No. 6. There are also some sandstones, not exceeding 10 to 15%



MINING PLAN for miner with extensible rope belt includes pairs of rooms on close centers. Panel is mined on retreat.



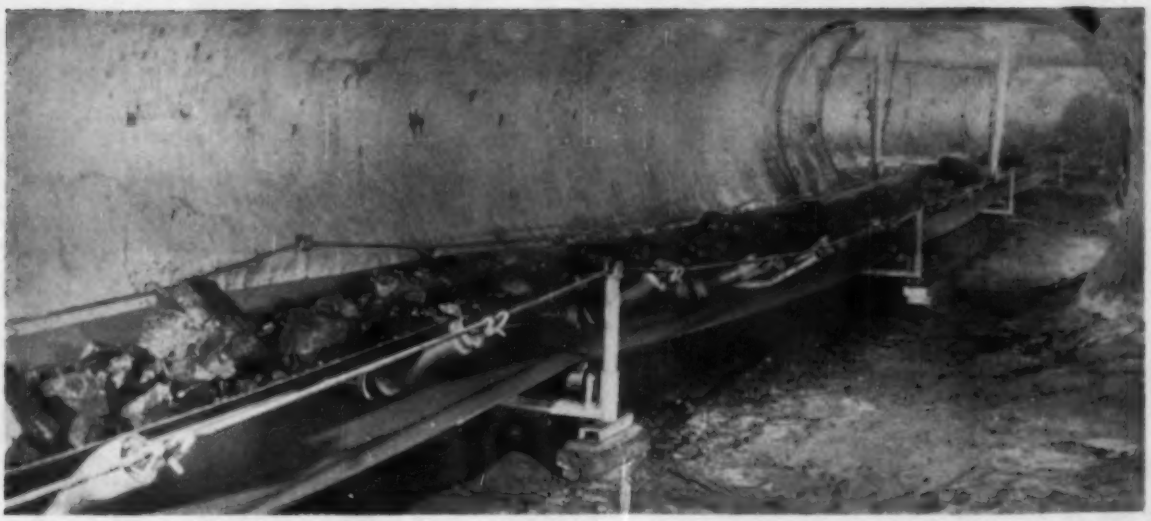
MAIN-ENTRY DEVELOPMENT plan includes driving four headings in pairs. Letters and numbers show mining sequence.

of the total, near the upper part of the overburden.

BEGINNING CONTINUOUS MINING

Old Ben's continuous mining program began on March 3, 1954 when the first of two Goodman 500's went into service. This machine was assigned to drive four headings in 27 South off 8th East South. The second unit went to work in headings on April 8, 1954.

Getting the machines down the shaft was a big job. An assembled unit is 23 ft 10 in long, 6 ft 3⅝ in high and 12 ft 2 in wide. Since the 36-ton giants were too large to be lowered in the shaft, they were dismantled and lowered in sections. Each of the machines was broken down into unit assemblies, lowered to the coal seam and hauled to a previously prepared assembly area. This area was 15 ft 4 in wide, 13 ft 6 in high and 12 ft long. A structural-steel frame made of 10-in beams, angles and plates was assembled in the opening. Two 5-ton hoists then were mounted on it to lift the 10-ton



ROPE BELT is Old Ben's newest transportation method. Unit eliminates intermediate sections, simplifies belt moves.

BELT COMPONENTS include spreader (left) that maintains rope gage and rope anchors (center) that keep rope taut. Method of attaching chain-link troughing idlers to ropes and a return-idler stand are shown at right.

gear box into position on the miner. Smaller components were handled by a single hoist.

The limitation of hazards to workers, protection of machine parts and the ease of assembly made the expenditure for the frame worthwhile. It can be disassembled and moved to a new area as needed.

When it is necessary to replace a rotating head in a working area, the continuous miner is backed away from the face to a crosscut. A chain-hoist secured to roof bolts then is used to lift the head.

Early experience with the boring-type miner showed that the best results were achieved with only two cutting arms on each vane of the rotor. A reduction in the area of the kerfs also kept power consumption to a minimum and increased the percentage of coarse coal. These benefits were achieved without reducing the efficiency of the mining operation.

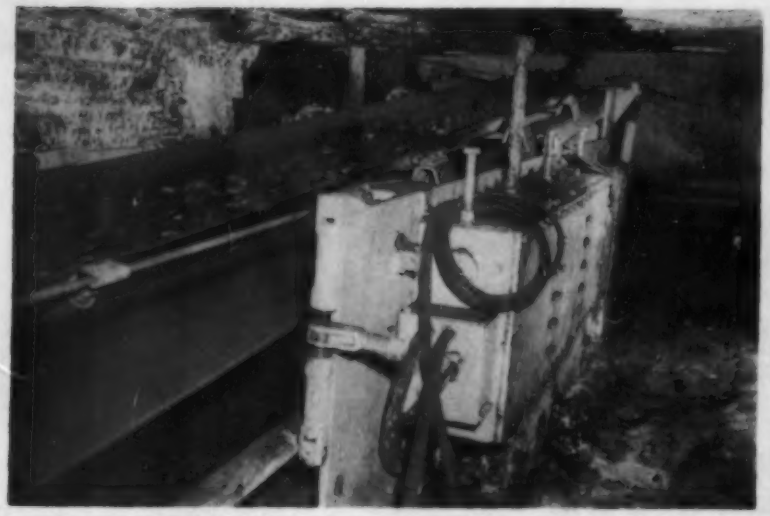
ENTRY DEVELOPMENT

To keep tramming time to a minimum, and thereby permit the continuous miner to work a maximum of time, headings are driven in pairs. In a four-heading system, the two headings on the left are intakes and those on the right are returns. The two places on the left are first driven 180 ft. This provides room for three breakthroughs and also is the same distance as loading station move-ups. The No. 1, or left heading is driven 60 ft to the first breakthrough. Then the miner is moved backward to the No. 2 heading. This opening is driven 60 ft and then a breakthrough is cut to the No. 1 heading.

The machine then continues in the No. 1 heading for 60 ft, starting the cycle as before. Thus the No. 1 head-

Old Ben Officials

Chairman of the Board	D. W. Buchanan
President	D. W. Buchanan, Jr.
Vice President, Operations	Howard Lewis
Vice President, Engineering	J. W. MacDonald
Asst. to Vice President, Operations	W. C. Campbell
Superintendent of Plants	George Strunck
Chief Electrical Engineer	Hollis Pierce
Superintendent of Maintenance	Frank Eubanks
Superintendent No. 9 mine	George Stachura



DRIVE AND TAIL SECTIONS of the extensible belt, shown above and below in photos from another property, both are powered by 25-hp motors. Drive section travels 80 fpm. Tail-section reels hold 600 ft of rope.

TYPICAL FALL like this follows extraction of room pillars with continuous miner. Ventilation is simplified, recovery is increased in continuous mining.

ing always is driven 60 ft, then No. 2 is advanced 60 ft and a breakthrough cut from No. 2 to No. 1. When the third breakthrough is completed, the machine is moved back to the last breakthrough between No. 2 and No. 3 and then into No. 3.

The mining sequence in driving the two headings on the right is somewhat different than for the left headings. For the first 120 ft the sequence is the same except the second breakthrough is cut at 90 deg rather than 60 deg. When the third breakthrough between No. 3 and No. 4 is completed, the miner continues to advance and cut into No. 2. Thus the solid pillar between the intakes and returns is penetrated once in 180 ft.

Three shuttle cars were used with each of the original continuous miners. One was modified to serve as a surge car behind the miner and the other two carried coal to the loading station.

Early studies showed that when the miner was advancing 4 to 10 in per min, production was 1.1 to 2.8 tons per min. Current requirements varied from 250 to 800 amp and peak load on the motors was 268 hp.

To provide control of dust at the face, 8 gpm of water is sprayed on the coal as the machine bores ahead.

TODAY'S METHODS

About a year ago Old Ben made a study to find out what mining system would permit the continuous miners to produce the most coal. Two representative continuous mining sections were studied for 6 mo on each of the two shifts. One unit worked in entry development and the other in rooms and pillars. At the end of the test period, the results showed that the machine produced 40.2% more coal per shift in room and pillar work. The weight of the roof permitted the continuous miner to penetrate the coal much faster. Management then decided to lay out future mining areas so that a maximum of production could be obtained from rooms and pillars.

The first room panels were developed with three headings on 37-ft centers. Breakthroughs were cut on 71-ft centers. Headings were cut in an oval shape as the continuous miner bored ahead. At the widest point, the heading was 13 ft 2 in wide. It was cut 7 ft high, leaving top coal for roof support.

After headings were developed to a depth of 1,425 ft, three bleeder rooms on 35-ft centers were driven to the next entry. Two rooms on 18-ft centers were then driven 441 ft to the next entry. The centerline of the inby room was projected opposite an entry breakthrough to give shuttle cars a

LOUDSPEAKER SYSTEM in underground repair shop area simplifies communication among maintenance men.

REPAIR BENCH for trolley phones includes the latest types of testing equipment for making quick, accurate repairs.

straight route to the loading station. The outby room was connected to the entry by a diagonal leading to the next outby entry breakthrough.

Pillars were removed by driving through at a 45-deg angle, leaving a 5-ft fender to protect the operator and machine from unexpected falls. This thin support was split several times after the lift was completed. The small stumps crushed out under the weight of the roof because of the soft material in the center of the seam. Chain pillars opposite room pillars also were split.

Mining in the 1,425-ft room panel was started Dec. 15, 1955. Development was completed on the first shift Jan. 18, 1956 and room work was started on the second shift. The panel was completed Sept. 17, 1956, after 160,629 tons of coal were mined.

Overall recovery of coal within the mining limits was 83.7%. Management points out that recovery might be greater because the chain pillars left in to protect the haulway might be recovered from the following panel.

Output per shift in clean coal averaged 457.6 tons per shift. Room production ranged from 591 to 668 tons and averaged 624 tons.

ROPE BELTS

The next step in underground improvements was the addition of a Goodman 36-in panel rope belt. Results were so satisfactory that a delivery schedule has been arranged for further extensive use.

This installation was followed by the purchase of a Goodman 36-in Ropex extensible belt, with delivery made in September, 1956. Mining plans have been revamped to permit these conveyors to be used most effectively.

Rooms are now projected to be driven 525 ft deep. Heading centers have been changed to provide larger chain pillars which can be recovered after rooms cut through. All entry breakthroughs are driven 90 deg with the headings to permit the Ropex belt conveyor to be used in the long rooms.

In developing the room panel, the Ropex extensible unit is installed in the middle heading. This permits the panel rope conveyor to be installed in the right heading and be ready when the limit of the Ropex unit is reached. The Ropex belt is used for the first 610 feet of development.

Two Joy 10SC shuttle cars are teamed with the Goodman 500 miner in driving the three headings. Coal is discharged directly onto the tail section of the extensible belt. When the regular rope belt goes into service, shuttle cars travel to the right heading to discharge.

As the headings are advanced, rooms projected for the extensible belt are driven 45 ft and breakthroughs are cut to the centers of the adjoining rooms. This provides room for the extensible belt, bridge conveyor, surge car and continuous miner when room work starts.

When the room panel reaches its 940-ft limit, the extensible belt is set

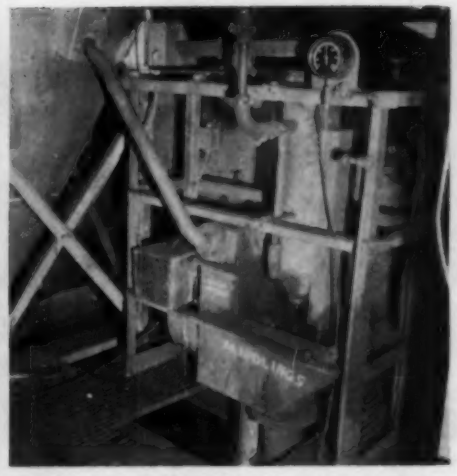
How a Continuous Miner Performed in a Typical Section

Month	Tons — Entries	Tons — Rooms	Total	Average Tons Per Shift
December (part).	8,148		8,148	428.8
January.....	12,119	8,800	20,423	486.5
February.....	.....	25,215	25,215	600.4
March.....	.....	15,155	15,155	631.5
April.....	.....	12,745	12,745	637.3
May.....	.....	18,255	18,255	668.0
June.....	.....	14,316	14,316	650.7
July.....	.....	16,836	16,836	625.2
August.....	.....	17,817	17,817	593.9
September (part).	.....	11,223	11,223	590.6
Total.....	20,267	140,362	160,629	592.2

Size Consist, Continuous Mining

Size	UNIT NUMBER 506 Pillar Recovery % Each	506 Pillar Recovery % Cum.	503 Development % Each	503 Development % Cum.
Plus 6 in.....	5.12	5.12	13.70	13.70
6 x 3.....	13.16	18.28	15.97	29.67
3 x 2.....	10.59	28.87	9.16	38.83
2 x 1½.....	8.22	37.09	5.63	44.46
1½ x 1.....	6.41	43.50	4.01	48.47
1 x ¾.....	9.45	52.95	6.21	54.68
¾ x ⅜.....	14.52	67.47	11.11	65.79
⅜ x ⅛.....	4.23	71.70	3.50	69.29
⅛ x 0.....	28.30	100.00	30.71	100.00

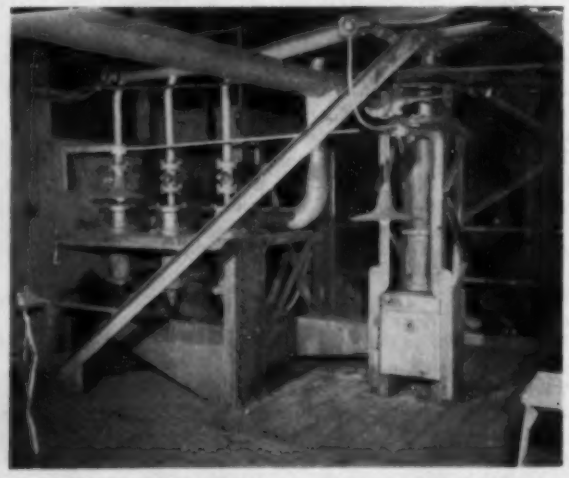
DENSE-MEDIA washer upgrades 6x3½ coal to less than 7.5% ash while making efficient recovery. Primary and secondary baths are used.



AUTOMATIC CONTROL of gravity in dense-media washer is more accurate than manual.

Old Ben's preparation facilities, designed to process

MAGNETITE RECOVERY from underflow of rinse screens is achieved with this drum-type magnet.



WATER CLARIFICATION is done in two-stage cyclone circuit. Primary unit is 14 in, three secondaries are 7 in.

up in a breakthrough and room neck 72 ft from the end of the panel. A pair of rooms on 18-ft centers then is driven through to the next room panel to establish ventilation for pillar work. Panels are projected on 615-ft centers. The narrow pillar between the two rooms is split as the miner and extensible belt move out of the room.

To provide bleeders at the end of the panel, two rooms on 72-ft centers are then cut through to the next panel. Pillars are left intact.

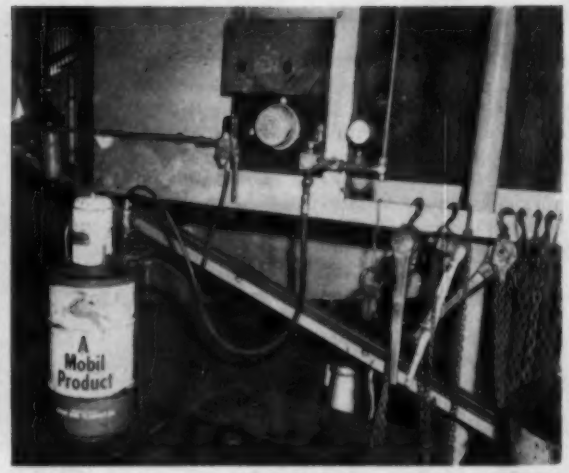
With the bleeders completed, the panel is ready for room and pillar work in an area blocked out with pairs of rooms on 18-ft centers. Each pair is 72 ft apart, leaving 54 ft between the two closest rooms. Breakthroughs are cut on 60-ft centers from right to left as the rooms advance.

When the two rooms cut through, the continuous miner crosses the heading of the next panel and splits the chain pillar twice on a 45-deg angle. A pair of 10SC shuttle cars behind the bridge conveyor on the extensible belt permit the miner to reach to the chain pillar.

Starting 500 ft from the mouth of the inby room, the continuous miner makes cuts through the solid pillar between pairs of rooms. Each lift is made on a 45-deg angle and 25 ft from the preceding one. A 5-ft pillar is left next to the gob to protect the operator and machine against unexpected falls. When the lift is completed, the narrow pillar is split several times. The small stumps between the splits support the immediate roof but crush out with a general fall. The chain pillars between the left and middle headings are split after each room pillar is recovered.

Old Ben finds that pillar recovery is greatly simplified with continuous miners. Roof-control problems are reduced considerably, because each room is pillared as soon as it is completed. Furthermore, each new room is always 40 ft from the fall area. Ventilation problems also are simplified because each unit operates on a separate split. Each machine also maintains an independent pillar line.

STORAGE BINS permit smooth operation of preparation facilities. Plant has 14 of these 100-ton units.



CENTRALIZED lubrication system in dense-media section distributes grease automatically in correct quantities.

900 tph, include the latest methods

DIESEL SWITCHER does yeoman work in handling all empties and loads at 900-tph plant. The 35-ton unit pulls 5 to 7 cars in a train.

The initial installation of the Ropex unit is Old Ben's first experience with extensible belts. It is quite likely, as with most new equipment, that optimum results and methods of using the extensible belt may not be reached for several months.

CREWS

The crew assigned to a continuous mining unit varies with the type of work and equipment. For example, a panel crew in a track entry consists of a continuous miner operator and helper, two shuttle car operators, one mechanic, one motorman and one foreman. In main-entry development, two roof bolters are added to the crew. In the rope-belt section one man is assigned to the tail section of the extensible unit instead of to a shuttle car.

ROOF SUPPORT

The strength of the immediate roof varies in Old Ben No. 9. In the south and west portions, roof bolts are used only when slips are present in the roof or when the seam is extracted to the rock. Props set on 3 ft centers provide ample support in pillars. Four of Old Ben's continuous miners operate under these conditions.

In parts of the north and east sections of the mine the top coal is friable and does not provide good support. Therefore, to provide maximum protection against roof falls all places are bolted. Machine operators are not permitted to work beyond the roof bolts. Two of the Goodman 500's work in this area. Since the machine operators are not permitted to work ahead of the roof bolts, the continuous miners must be moved to the next heading after advancing 18 ft.

On main-haulage headings a 2x8-in by 8-ft treated plank is bolted to the roof. This prevents spalling around the bolts. Roof bolts are installed with either a Chicago-Pneumatic RBD30 or Fletcher rotary roof bolter. Each continuous miner section is provided with a roof bolter. In general 5-ft expansion-type bolts are used. But where anchorage is poor at this depth, longer bolts are used.

HAULAGE

Coal is hauled to the hoisting shaft in Watt 7-ton steel mine cars equipped with Ohio Brass automatic couplers. Each train is made up of 35 to 45 cars and is pulled by 13- to 20-ton locomotives. Gathering locomotives are 8-ton units that move cars in groups of 6 to 8. A Nolan car spotter is used to handle cars at the loading point in the first section equipped with the rope belt. A Stamler car-spotter is used in the second rope belt section.

HOW COAL IS CLEANED

Mine cars are emptied by a full-turn Link-Belt rotary dump that discharges into Connellsville skips. After reaching the top of the headframe, skips empty into a hopper. A 900-tph reciprocating feeder then delivers it to a Link-Belt shaker screen for separation into plus 6-in lump, 6x3½ and

3½x0 fractions, handled as follows:

The plus 6-in lump flows to a 24x60 McLanahan & Stone double-roll Rockmaster crusher. The resultant product is screened at 3½ in on a Robins Gyrex vibrator and the oversize is mixed with the 6x3½. This size then passes to a new McNally Pittsburg dense-media section with Tromp bath equipment. In operation since July 10, 1956, the new facilities include an 8-ft primary bath, 6-ft secondary bath and auxiliary equipment.

NEW HEADQUARTERS for Old Ben operations are in this air-conditioned building. Operating, engineering and accounting departments share building.

DENSE MEDIA WASHING

Old Ben's goal with the new dense-media section is to prepare 6x3½ with less than 7.35% ash. The efficiency of recovery and plant performance has fulfilled the company's expectations. In the first month of operation the ash content averaged 7.20%. For the second month it was 7.27%. This is the second McNally Tromp plant operating at Old Ben mines. The first has been processing coal at Mine No. 22 since January, 1952, and is the first of its type installed in the Western hemisphere.

Medium is circulated in the primary bath by a 3,000-gpm Hazleton pump. Clean-coal drainage is provided by a 6x14-ft double-deck Allis-Chalmers Low Head vibrator. The clean coal may be directed to a McNally Pittsburg Gearmatic crusher for reduction to 1½x0, or sent directly to a boom for loading as 6x3½ furnace coal.

Primary refuse is rinsed and drained on a high speed shaker screen equipped with Wedge-Wire 2-mm decking. The material then is reduced in an American Ring mill and discharged onto a belt-type elevator. It next is wet screened at ⅛-in on a Robins Gyrex vibrator. The 1½x⅛ flows to the secondary McNally Tromp bath for recovery of the saleable coal. This is about 30 to 40% of the crushed middlings.

Both products of the secondary bath pass to a divided-deck McNally Pittsburg high-speed shaker for draining and rinsing. Refuse is then carried by inclined scraper to a storage bin in the main preparation plant. Clean coal is carried to the main preparation plant for mixing with jig-washed coal of the same size.

Ready-ground magnetite is used as a media. It contains not more than 5% plus 100M material and not less than 70% minus 325M fines. Circulation of medium to the primary and middlings circuits is provided by separate Barrett-Haentjens 3,000-gpm pumps.

The initial drainage from the bath products is returned to the sump for recirculation. Spraying with dilute medium or clarified water removes the remainder of the magnetite. Part of this media is reused for rinsing. The balance passes to a Dings Alnico drum-type magnet which recovers the magnetite for reuse. The water-borne tailings are used for wet-screening of crushed middlings and eventually flow with the ⅛x0 to a sump.

Tailings then are pumped to a water-clarifying facility made up of a 14-in primary McNally cyclone and three 7-in secondary units. Underflow from all the cyclones passes to the Baum-jig feed and the clarified water returns to the dense-media plant for reuse in the final rinse sprays.

AUTOMATIC BATH REGULATION

Automatic regulation of the dense media is provided by McNally regulators consisting of a hydrometer well with constant overflow and underflow. The hydrometer is suspended from a beam, whose position operates a Minneapolis-Honeywell Modutrol that regulates the quantity of media in the circuit. The regulator is more accurate in performance than manual control.

AIR CLEANING

The raw 3½x0 from the primary raw-coal screen is carried by an inclined pan conveyor to the original preparation plant. There it is split and sent to a pair of Robins Gyrex screens that make a separation at ⅜ in. The ⅜x0 is elevated and conveyed to a battery of seven 4x10-ft and two 6x10-ft single-deck Ripl Flow vibrators for separation at 10M. The through product passes to a storage bin for shipment as raw 10Mx0. The overproduct flows to four 20-ton surge bins feeding two American twin-deck air cleaners. Clean coal passes to storage bins where it is oil treated when required.

JIG WASHING

Middling and reject from the dry plant are mixed with 3½x⅜ raw coal and delivered to a 5-cell McNally Baum-type jig. Primary refuse passes to a storage bin and secondary reject is screened at ¾ in on a Robins Vibrex.

The overproduct from the Vibrex flows to an American stoker-coal crusher for reduction to minus ¾ in. It then combines with the primary refuse and flows to a 3-cell McNally jig for rewashing. Refuse from the rewash jig is carried to the refuse bin. A 15-ton Euclid hauls the refuse to a disposal area.

Clean coal from the rewash jig is mixed with the clean coal product from the primary unit and screened into 3½x2, 2x1½ and 1½x0 sizes on a double-deck Low Head vibrator. The 3½x2 and 2x1½ are conveyed to storage bins and the 1½x0 flows to a Low Head vibrator for separation at ¾ in. The ¾x0 is further screened at ⅜ in by two similar vibrators. The 1½x¾ and ¾x⅜ are carried in a divided conveyor to separate 100-ton storage bins. There is a total of 14 such storage bins in the plant.

Nut coals, ranging from 3½ to ¾ in may be diverted to either of two 36x48 McNally crushers for reduction to stoker sizes. The crushed material is sized on three double-deck Ripl-Flows and the plus ¾ in is recrushed by a third 36x48 crusher and then rescreened. The ¾x⅜ flows to storage bins and the ⅜x0 passes to a distributing conveyor, thence to reciprocating feeders for delivery to five 4x10-ft Ripl-Flow vibrators. Here the ⅜x10M is removed and sent to stor-

FIRST AID and mine rescue room near top of manshift is kept spic and span. Room is equipped with assorted medical and safety materials.

age bins. As the coal drops into the bin it may be oil treated. The clean 10Mx0 mixes with the raw dust and is loaded into railroad cars.

The clean ⅜x0 from the jig flows to a settling drag tank and is discharged into a dewatering elevator. From there it drops onto an Allis-Chalmers single-deck Low Head for dewatering and removal of the 28Mx0. The ⅜x28M flows to storage bins and an Allis-Chalmers 5x4 pump delivers the 28Mx0 to a settling pond. Clarified water is returned to the plant under pressure and reused for rinsing.

DIESEL SWITCHER

Handling of railroad cars at Old Ben's cleaning plant has been simplified with a 35-ton General Electric diesel switcher. With the aid of this unit, four men are able to do work that previously was done by 8.

The 35-ton diesel moves all the empties and loads during a 5,000-ton shift. In a typical work cycle it takes 5 to 7 empty cars from the empty hill and pulls them to the plant. Loads then are pushed ahead a short distance and the empties are secured to a Brown-Fayro car retarder. The switcher continues pushing the loaded cars across the scale, crosses the scale and returns to the empty hill via a runaround.

Old Ben has the distinction of being served by four railroads: the Missouri Pacific, Illinois Central, C.B.&Q. and C.&E.I. The mine also is only 40 mi from the Ohio River. Thus the company is able to ship coal by a variety of routes.

RADIO COMMUNICATION

Short-wave radios installed at strategic locations permit fast communication between mines, central office or supply headquarters. There are six General Electric units now in service. A central transmitter is located at the Benton office. Other units are installed in the top foreman's office at each mine as well as the central supply room, supply truck and chief electrical engineer's car. In a matter of minutes key men throughout the property can be alerted in case of an emergency. The units also speed delivery of emergency supplies. The chief electrical engineer also can be contacted quickly in event his advice is needed on an electrical problem.

SAFETY GAINS

Hand in hand with the Old Ben mining and preparation improvements is a continuing program to improve safety. Within the past year Old Ben has concentrated its safety efforts on monthly meetings at each mine. Meetings are scheduled so that all supervisors can be present.

At these meetings, the superintendent and safety engineer, Paul Tisdale, analyze each accident that took place the previous month at that mine. Conditions leading up to and at the time of the accident, any mistakes and what action should have been taken are given a close look. A friendly atmosphere prevails during the meeting. It is more a discussion than a lecture and suggestions are encouraged. Pointed criticism is not directed to any foreman. But the discussion is steered to developing methods of preventing similar accidents in the future.

Old Ben's safety program is not confined to the supervisors alone. The company works closely with the Illinois mine inspectors in teaching safety to the workers. Several times each month, before the beginning of the shift, mine officials and State inspectors meet with special groups. For example, timbermen might be picked out for one meeting. Safety practices applying specifically to timbermen are discussed for about 15 min. This type of meeting has been found to be effective because the group is small and everything discussed applies to each man.

When the mantrip arrives on the section, the section foreman takes several minutes to discuss safety in their working area. Any particularly hazardous condition is given special attention. The last thing the men hear before heading to the face is to work safely.

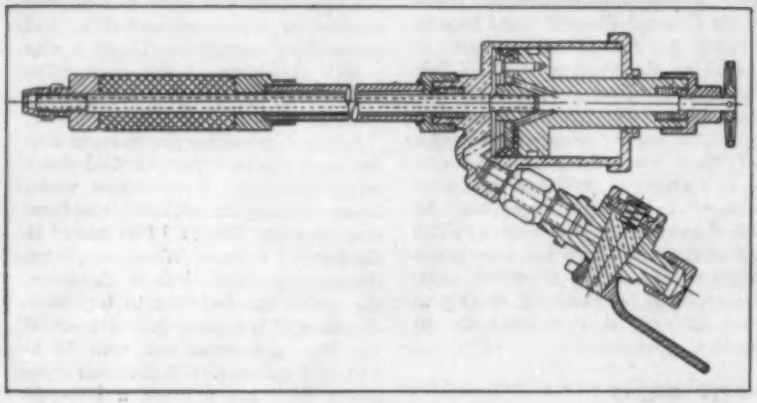
To keep enthusiasm at a high pitch, the company holds a safety banquet at the end of each quarter for all supervisors. Programs are varied to promote interest. Throughout the year talks are given by company men, speakers from the state and federal bureaus of mines are called in and safety films are shown. There is also a general review of the progress in safety. If progress lags in any quarter, that, too, is discussed.

Safety bonuses for the foremen also are an important part of Old Ben's safety program. If a section works 3 mo without an accident, the foreman receives 500 to 1,000 points in the form of a check. When negotiated through the chief clerk of the mine, the check can be used to buy merchandise. Each point is worth about 1c. Thus a foreman can earn $5 to $10 each quarter. If a foreman completes the year without a lost-time accident, he gets an additional 5,000 points as a bonus. His bonus for the year can be $90.

Aside from promoting safe work habits, Old Ben is prepared for any emergency that might arise. The company supports two fully equipped miner-rescue teams which meet once a month to practice rescue techniques. An old blacksmith building has been remodeled to serve as a center for first-aid training, safety meetings and so on.

Each supervisor is required to carry an MSA self rescuer. There is a box of six similar units on each main-line locomotive, and a box of 20 is stored on each section with the first-aid equipment. In each box of 20 there is a pair of nod-and-shake smoke goggles and 50 ft of life line that would help a foreman lead his men to safety in event of a fire or explosion.

With an efficient continuous mining program underway, modern preparation facilities and an aggressive safety program, Old Ben No. 9 is ready for a long, productive life.



Legal requirements, dust prevention, and dust suppression with steam, static infusion, pulsed infusion, water sprays, foam, and wet and dry drilling in British coal mines.

Suppression at the Source

FIGS. 1 & 2—WATER INFUSION OF SOLID COAL—static or pulsed—was used on over 25% of the faces requiring dust suppression in Great Britain in mid-1956. Equipment includes infusing tubes and pressure and flow meters.

How Britain Controls Dust

By WILLIAM BOYLE
Mining Engineer, Mining Operations Branch,
National Coal Board of Great Britain

SOON AFTER NATIONALIZATION of the coal mines in Britain, the National Coal Board established as a principle the proposition that all airborne dust underground may be dangerous, and that it would take steps to deal with the dust problem at all collieries in the country. Standards of dustiness were agreed on with all interested bodies but these standards have no legal backing, being arbitrary ones based on mining experience and on postwar medical research in South Wales.

On Jan. 1, 1957, however, the Mines & Quarries Act, 1954, came into force and under this new act the colliery manager has several duties with respect to dust. These may be summarized as (1) prevention, (2) suppression, (3) dispersal or trapping of airborne dust, and (4) cleaning up and stonedusting.

The types of dust specified are (1) any dust that is flammable, and (2) dust of such character and in such quantity that it is likely to be injurious to the persons employed.

The manager first must insure that the "giving off" of dust is "minimized," and second, that its entry into the air, or its accumulation in circumstances which might be dangerous or harmful, is minimized by appropriate measures taken as near as possible to the point of origin of the dust. If any of the dust enters the air, he must insure that it is trapped or dispersed so as to render it harmless. Lastly, if any of the dust is not prevented from accumulating in circumstances which might be dangerous or harmful, he must insure that it is either systematically cleared up and removed, or treated in an approved manner to render it harmless.

Only in a long thesis could all the measures necessary to implement these statutory requirements be covered, and much of that would be a repetition of facts well known to

mining engineers and scientists. Consequently, this article is confined to more recent developments and to a few comparatively difficult problems which are the subject of research and development.

Prevention

Prevention of the production of dust in mining operations involves high efficiency in the maintenance of machinery and in the selection of methods of getting and transporting coal. It is a problem for which there is no overall solution but which calls for carefully maintained attention both to major factors and to details. Like firedamp and other offsprings of nature, dust has neither patience or sympathy with the man who takes it for granted and does not continually afford it due respect.

Nevertheless, much still remains unknown about the factors governing the formation of dust, and in the board's Mining Research Establishment fundamental research work is being carried out in an attempt to establish these factors. In particular, the amount of dust produced by coal during shatter and the way in which it is produced are being examined.

Suppression

The principal agent used to suppress dust is water, but in all cases the successful application of water depends on its use being adjusted to the source of dust or local circumstances. For example, the type of spray, including the size frequency of the water droplets suitable for wetting layers of dust deposited in a roadway, will not be suitable for use with, say, power-loading machinery or for wetting coal moving on a conveyor. Also, the amount of water required for infusion or spraying depends to a great degree on the moisture content of the coal seam.

If all the factors are considered, it is found that water is highly effective in controlling dust in the majority of circumstances. However, for many years in many countries attempts have been made to increase the efficiency of water by adding surface-active or wetting agents, thus decreasing surface tension and, theoretically, increasing the water's ability to "wet" dust. It is necessary, therefore, to say something at this stage about wetting agents in dust suppression.

WETTING AGENTS

It has been shown in the laboratory that wetting agents, applied in the correct proportions, can increase the effectiveness of water in wetting settled dust: i.e. layers of dust. The wetting agent and water mixture percolates more quickly through the dust layer and wets it to a greater depth than water alone. This explains the success of these agents in the consolidation of roadway dust. In this technique the roadway dust must be thoroughly moistened before the application of the hygroscopic salt (calcium chloride) and the use of a wetting agent in the spray water insures this thorough wetting. The amount of wetting agent used in this application is between 3 and 5%.

The success of this application suggests that wetting agents may be useful in other circumstances, such as, in the spray water used to wet heaps of broken coal and rock before loading. These possibilities are being examined but results are not yet available.

The results obtained by using wetting agents in other operations have been much less conclusive. Thus, trials have been carried out using wetting agents in wet cutting, water infusion, and spraying conveyors and mine cars but no consistent results have been obtained. In some cases, the efficiency of dust suppression has been higher than with water alone. In other cases no difference has been measured. And in a few instances the efficiency of the mixture has been less than that of water.

It is possible that in some instances the failure was due to the use of a wetting agent which frothed, forming air bubbles which carried dust particles into the airstream. In general, however, it has been found that there is little to choose between the various wetting agents, provided the amount used is adjusted to suit the proportion of active agent in the product. Usually, economics decide which wetting agent should be tried.

Much work has been done by the board's research establishment and by the universities to determine whether advantages could be gained by including a wetting agent in the spray water used to suppress airborne dust: i.e., to take airborne dust out of suspension. An analysis of the results indicates that attention must be given to other factors before considering wetting agents. The type of spray, the water pressure used (which affects the atomization of the water) and the provision of surfaces against which the dust particles can be thrown by the water droplets must all be considered and the best combination determined.

Allowance must also be made for the quantity of airborne dust and the local air velocity. Only then would wetting agents be considered because if they gave any increase in efficiency at all it would be of the order of only a few per cent which, in most cases, would be insufficient to justify the inconvenience and expense of their use.

There are two possible reasons for the indecision about the efficacy of wetting agents. It has been shown in the laboratory that if broken material is agitated while being sprayed, it is wet just as effectively by water alone as by water containing a surface-active agent. This may be one reason why little or no advantage has been gained by using wetting agents in the sprays over conveyors or mine cars and at transfer and loading points. The other possible reason concerns the addition of the agent to the water in the correct proportions. For the applications mentioned previously it has been found that the proportion of agent required is very small—of the order of 0.1 to 0.2% Consequently, great difficulty has been experienced in finding a robust automatic device for proportioning these small percentages with reasonable accuracy.

It will be clear that the case for or against wetting agents is still far from being proved, but what work has been done indicates that they may provide benefits in some circumstances; some of which have been mentioned, and not in others. Also, there are many places where the suppression of dust to accepted standards is very difficult, and others where, for various reasons, such as, the need to avoid high humidities or damaging roof or floor strata, the amount of water used must be kept to a minimum. Bearing all these things in mind, the board decided to continue the trials of wetting agents and new types of proportioners, and these trials are still in progress.

Successful results have been achieved in a few instances by the use of a mixture of water, wetting agent and soluble oil, and the possibilities are presently being explored.

STEAM SUPPRESSION

For many years steam has been used on the surface to suppress dust at dumps and other points. Some years ago steam was used experimentally instead of water for infusion of the solid coal. It also has been used at underground loading stations where it was found that the same degree of suppression was achieved with a much smaller quantity of water in the form of steam than with water as such.

Its use underground was severely restricted, of course, by the absence of a suitable flameproof boiler, but a flameproof electrode boiler has now been designed for use at an under-

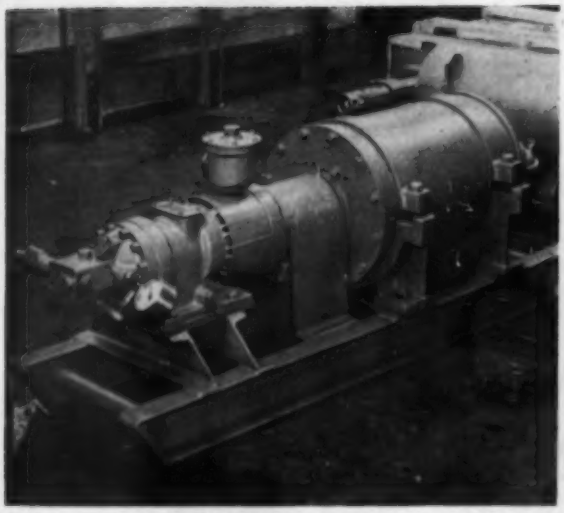


FIG. 3—**PORTABLE INFUSION PUMP** providing pressures up to 1,000 psi with 10 hp.

FIG. 4—**COMBINATION INFUSION PUMP** and water tank for use where water lines are not available.

ground skip-loading station. With this development, further research into the possibilities of steam has been initiated.

Suppression at the Source

WATER INFUSION

One method of suppressing dust at the source is forcing water into the solid coal under pressure. This process is termed "water infusion," and is done through drill holes.

There are so many variables associated with the application of water infusion that it is impossible to lay down any universal rules. The success of infusion in any seam depends on a systematic study of the factors which condition the penetration of water into the seam with a view to adapting the method to the particular conditions of the face. Nevertheless, during the past 10 yr there has been a gradual increase in the application of water infusion, both alone and in combination with other methods, until in June, 1956, it was applied to 27% of the total length of coal face requiring dust-suppression measures.

Infusion is used in all the coalfields in Britain, thus covering a great variety of coal seams, and this has resulted in modifications and developments of the technique to suit the various circumstances. The development of "pulsed infusion," for example, reflected a desire to expand the advantages of the loosening of the coal which follows infusion.

INFUSION PRACTICE

Infusion is employed both in longwall and room-and-pillar mining, and in seams from about 18 in to at least 8 ft. It is used mainly to suppress dust but also to prepare the seam for certain methods of working.

The factors which have been found to influence the effectiveness of infusion are as follows:

Position and Direction of Infusion Holes—These are determined by experiment, taking account of the thickness of the seam, the formation of cleavages and breaks (and the direction of the face advance relative to these), the nature of the seam, and the nature of the roof and floor. The infusion holes are generally located in the upper third of the seam, although in the thicker seams, depending on their nature, they may be located on two levels and staggered to effect a more uniform infusion. When the seam contains a dirt band the holes may need to be located both above and below the band.

Experience in Britain has shown that the holes should cut the main cleavages, or slips, at an angle of from 60 to 90 deg. However, some prefer to drill the holes at right angles to the face at all times irrespective of the line of cleavage. These same holes are advanced each day or so that the face does not become riddled, which would add to difficulties of infusion.

If the banding of the seam is such that there are comparatively thick bands of soft or friable coal, infusion through holes drilled in these bands may prove unsuccessful, as the porosity of the band might be such that the infusion would not affect the rest of the seam. In these cases, infusion could be made more efficient by drilling in the harder bands, by locating the holes on two levels, or by drilling holes inclined to the horizontal.

Finally, care must be taken in the vicinity of disturbed ground, particularly fault areas, because the roof and floor may be weaker and the coal softer. If the roof and floor are noticeably weaker, it is advisable to leave an area of, say, 50 ft on each side of the fault without infusion. Or, trials may be carried out using more holes with less water and a reduced rate of infusion. A double-seal infusion tube, which is described later, is often found useful in these, and other, circumstances.

Spacing of Infusion Holes—The spacing of the infusion holes is governed by the factors cited in the previous section, bearing in mind the economics of the operation: i.e., the labor requirements and its place in the cycle of operations. The distance varies from 3 to 30 ft throughout Britain, but usually is between 9 and 15 ft. Where it is essential to have the holes only a short distance apart, it is sometimes necessary to plug holes adjacent to the one being infused to prevent water escaping too easily through them.

Diameter of Infusion Holes—Infusion holes vary between 1¾ and 2⅛ in in diameter. Bent or damaged drill rods must not be used since they would increase the diameter and prevent satisfactory sealing.

Position of the Seal in the Infusion Hole—The position of the seal in the borehole is one of the most important factors and one which may mean the difference between the success or

failure of infusion in any seam. First, of course, care must be taken to lodge the seal in a reasonably firm area so that it will resist the water pressure. Generally, this is about 2 ft from the mouth of the hole, but experience and skill are needed to fix the correct position. Careful choice of position often permits a reduction in the water pressure.

The seal must be so placed as to prevent the water from breaking out in the vicinity of the hole without penetrating the inner slips. On the other hand, in some cases, the inner slips are adequately infused but the water reaches the face at points remote from the hole, leaving the breaks in the vicinity of the hole untreated. Also, it may be found that the water pressure available is insufficient to insure percolation of all the slips at one setting of the seal. In such instances, the seal first would be located near the outer end of the hole. After infusing the water breaks it would be moved further in and a second infusion carried out, or vice versa. Where conditions permit, a double-seal infusion tube can reduce the time required for this operation.

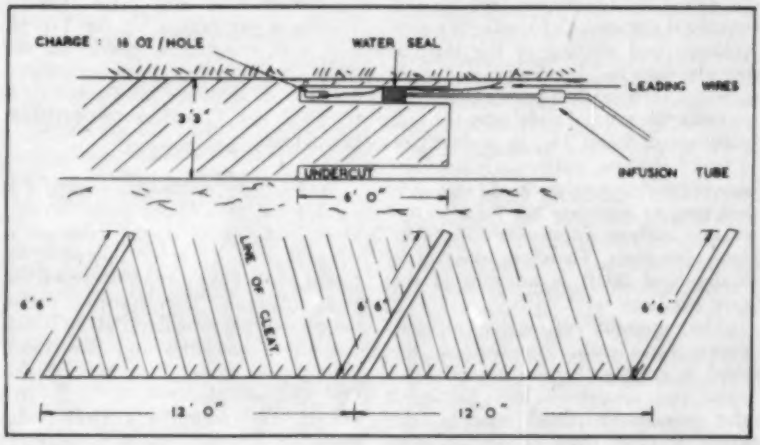
Quantity of Water—It takes some time to determine the quantity of water required to effect good dust control with infusion, bearing in mind the need to avoid affecting roof and floor strata.

The quantities used vary considerably with local conditions. Throughout the country the range is from 3½ to 60 gal per hole, although the range in the majority of seams is 5 to 20 gal. Many people calculate requirements on 1.2 gal of water for every 10 to 15 cu ft of coal. However, because conditions vary so widely, this figure should not be taken as more than a rough guide.

Rate of Water Flow—Water infusion can be successful only if the rate of flow of water is properly controlled by means of a water meter. Such control is necessary to insure that the water spreads properly throughout the seam, and is especially important where the roof or floor is weak. The efficiency of dust suppression increases as the rate of flow decreases. Usually the maximum rate of flow should be 2½ gpm although in soft or crushed coal it may need to be reduced to 1¼ gpm.

Infusion Pressure—Usually the pressure required at the start of infusion to overcome the initial resistance is higher than that needed when the water is flowing. Thus, an initial static pressure of 800 psi may drop to a flow pressure of 600 or less. Thereafter, sufficient pressure must be available, either from the line or a booster pump, to maintain the rate of flow at about 2½ gpm.

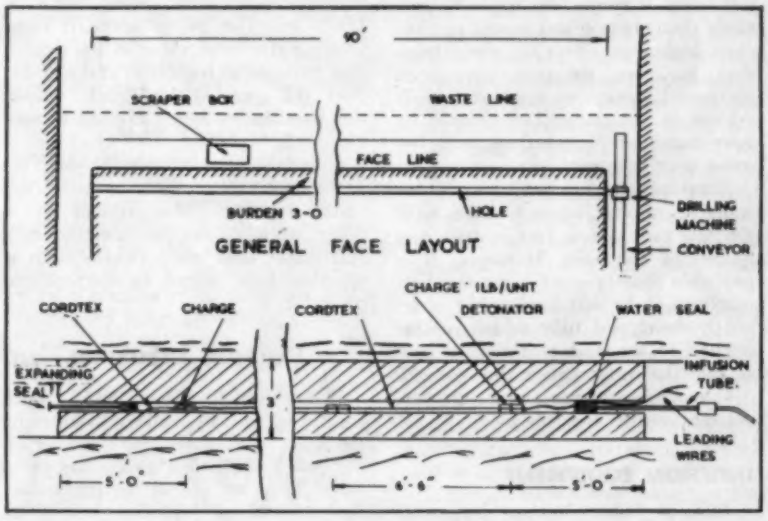
In the majority of seams presently being infused, the pressure required varies from about 100 to 500 psi, although with favorable conditions the flow pressure may be much lower than 100. On the other hand, much of the increase in the use of infusion is due to infusion pressures much higher than those of a few years ago. At present, pressures of over 1,200 psi are being used. In some cases these high pressures are necessary for effective infusion. In a few high pressure also loosens the coal thus facilitating mining by explosives or machinery.



SHORT HOLES, UNDERCUT COAL

Basic Pulsed-Infusion Schemes

LONG HOLE, SPACED CHARGES



Depth of Infusion Holes—In normal practice, the depth of the borehole depends on the rate of advance of the face, on the depth of undercut or strip to be taken, and on the distance beyond the face to which the cleavage planes have been opened by strata movement. The general opinion in Britain is that the infusion hole should be about 1 ft deeper than the undercut or strip to be taken off. This practice insures some wetting of the newly exposed face.

Deep Infusion—There are many seams in which infusion to a depth of even 5 ft is difficult enough, often requiring very high pressures. However, there are circumstances where infusion to a greater depth is advantageous. On some faces, for example,

the time interval between infusing and mining is not enough for effective percolation and wetting of the dust in the cleavage and break planes. Consequently, infusion has been carried out to twice the normal daily advance and maintained there: i.e., to a depth of 8 to 10 ft. Also, particularly on fast-moving continuously mined faces, it is not easy to complete the infusion operation without interfering with other face operations. Therefore infusing to a depth of 20 ft in advance of the face has been tried.

The quantity of water infused varies considerably. Sometimes the total is greater than in normal infusion, and sometimes less. Similarly, the pressure required may be the same or more than in normal infusion. It is likely that in most seams it would be much more. In one instance, the pressure to infuse through 20-ft holes was 1,000 psi compared to 150 psi in normal infusion with 5-ft holes. It seems reasonable to conclude that many seams would require even higher pressures for deep infusion. However, the trials have been successful enough to warrant extended use of the system, whereupon its advantages and limitations will become more apparent.

Deep infusion has been carried out using a normal infusion tube with the seal only a few feet in from the mouth of the hole. However, it is probable that in most cases the best results will be obtained using a recently developed tube which can be pushed to the end of the long hole so that the water enters the seam 20 ft or more in advance and slowly percolates towards the free face.

INFUSION EQUIPMENT

Infusion Tubes—Various designs of infusion tube are available from a number of manufacturers. Some are screw-operated, others are operated by a lever and cam or a ratchet, and one (Huwood, Figs. 1 and 2) is operated hydraulically, with the water pressure expanding the seal. For friable coal, and other applications mentioned previously, a double-seal tube has been developed which permits the water to flow from the end of the tube as usual; through perforations in the outer tube between the two seals; or through both at once.

More recently, a small tube has been developed in which the water pressure operates a small internal piston which in turn compresses the seal. The mechanism compressing the seal is all inside the tube so that it can be pushed to the end of a long hole for deep infusion. This tube is constructed in local workshops of the board.

Pressure Gage and Flow Meter—The need for regulating the rate of flow and keeping a check on the water pressure has been mentioned earlier. A typical arrangement is shown in Fig. 1, with meters installed in the line.

Water Supply—Infusion normally is carried out with water from the service lines, but often the pressure is not sufficient. Therefore, portable infusion units have been developed for such situations. They also are useful for conducting infusion trials in which pressures, quantities and flow rates, among other things, have to be varied. One such unit is shown in Fig. 3 (Huwood). The pump is a swashplate-operated, five-ram, constant-delivery-type unit delivering 13.2 gpm at 950 rpm at pressures up to 1,000 psi. It requires an input of 10 hp.

The pump is fitted with an adjustable relief valve by which the maximum pressure can be varied from 0 to 1,000 psi. The pump normally runs blowing the relief valve at a set pressure (maximum required) and will deliver full quantity at slightly below this pressure on being opened to service.

Units also are available (Siskol, Fig. 4) for use where there is no piped water supply. These consist of a pump, prime mover (air or electricity) and water tank on a chassis with a wheeled base suited to the colliery track.

Pulsed Infusion

In addition to the benefits of dust control which can result from infusing the seam with water, the working of the coal by orthodox means has been eased in many places. In particular, the amount of explosive has often been reduced by infusing. Consequently, the idea that the techniques of water infusion and shotfiring might be combined was carefully examined by all interested bodies.

In pulsed infusion firing the holes bored in the coal are intended for both water infusion and coal breaking. The hole pattern may, in some instances, be similar to that for ordinary shooting, but this varies with local circumstances, as explained later in this article.

In most cases it is advisable to infuse the seam in the ordinary way as a first step. The pressure will vary with the seam characteristics but that which is effective for ordinary infusion will almost certainly be correct for pulsed infusion. The shothole is then charged in the normal manner but as a matter of good practice only one cartridge is used per hole. If more are charged there is danger of their being separated by the force of the water. The infusion tube is then placed in the mouth of the shothole, the water is turned on, and the shot is fired while under water pressure. Under some conditions it has been found advantageous to use a lower pressure for shooting than for the prior infusion, and experiments may be necessary to obtain the best results.

EQUIPMENT FOR PULSED INFUSION

The equipment used in normal infusion has been described earlier. The standard infusion tube has given good service at medium pressures but experimental work is continuing to find a stronger and simpler method of sealing the shothole. In general, a tube suitable for an infusion pressure of 1,000 psi is suitable for pulsed infusion.

Explosive—There are permitted explosives which are capable of withstanding low water pressures (20 psi) for a few hours, but for the high pressures now being considered special explosives, such as Hydrobel, have been developed. These have passed the official test for permitted explosives and also are capable of efficient detonation under water pressures up to 1,000 psi even after being subjected to this pressure for 24 hr.

Detonators—So far submarine-type electric detonators fitted with 120-in plastic-covered lead wires, 21 SWG, have proved satisfactory. Work is in hand to make available detonators which can stand very high water pressures.

Detonating Fuse—In longhole blasting (described later) use is made of Cordtex detonating fuse. It has high water resistance and has been tested effectively under pressures up to 5,000 psi. It is possible, however, for moisture to creep along the explosive core from any exposed end and this must be guarded against in practice. With standard Cordtex there is a slight risk of exploding a firedamp-air mixture if the fuse is freely suspended therein, but a modified form has been developed which is free from this danger.

PULSED-INFUSION TRIALS

Pulsed infusion has now been tried in cut coal, in solid coal using flanking holes, and in solid coal using a long hole parallel to the face. The latter trial has included both flat and highly inclined seams.

Flanking Holes—In this method, a number of holes are drilled in the normal manner along the length of the face. For example, in one seam 3 ft 3 in thick the face was undercut to a depth of 6 ft and the shotholes were bored 15 in from the roof and 12 ft apart. Sixteen ounces of explosives were used in each hole, and each hole was infused with 8.4 to 14.4 gal at 220 to 330 psi.

However, the flanking-hole method has its greatest potential advantage and widest application in solid coal. From the work already done, it seems probable that in many cases coal can be sufficiently loosened or softened so that it will become suitable for loading by a device of the plow type. In a few instances suitable conditions for hand loading have been achieved. The general method is to bore shotholes at a suitable angle to the face, usually 40 to 45 deg, and of such a length that they will provide the normal face advance. It usually is necessary to obtain a loose end or free face for the beginning of the shot-firing operation. This can be achieved by undercutting a short section or by fanning the first few shotholes from a small angle up to the normal angle to the face. The position of the shotholes must be settled by experiment in each case.

Long Holes—In this method a long hole is bored parallel to the face and it is this which has proved the most difficult to date. The long hole must be aligned exactly with the coal face, kept straight in the chosen direction, and remain approximately parallel to the roof and floor. Several types of drilling machines have been used and an increasing accuracy is being achieved, but the longest hole drilled accurately to date is no more than 130 ft.

In the long hole, a spaced charge is used and the cartridges of explosives are connected to each other by a line of Cordtex taped to the individual cartridges. It is necessary to experiment to determine the correct charge and this must be done with care, as there is not a very wide margin between an undercharged shot and one which is excessive. When the size of the charge has been determined it is best to prepare it on the surface and send it down in a special container.

The following is one way of charging the hole. First, a length of strong twine is threaded through the hole, either by drawing it through with the drill rods or with jointed wooden rods. The complete charge of cartridges and Cordtex is attached to the twine and pulled into the hole, generally starting at the end in which the infusion tube is to be placed so that the tube and primer cartridge are at the same end of the hole.

When the last cartridge is about to enter the hole a submarine electric detonator is inserted in the normal manner and a half-hitch is made around the cartridge and Cordtex with the leading wires. The charge is then pulled into its final position so that the primer cartridge is about 3 to 4 ft from the mouth of the hole, and the first cartridge a similar distance from the other end.

The infusion tube then is inserted into the firing end of the hole, and is coupled to the high-pressure water supply while the opposite end of the hole is being sealed. The seal may be a mechanical device in which a rubber seal is expanded by hand screwing, or, for low pressures, stemming and a wooden plug. The infusion tube seal is placed 12 to 18 in from the mouth of the hole, the water is turned on and when it is observed bleeding from the coal, the shot is fired under pressure.

Wet Cutting

Wet cutting is the most widely used form of dust suppression at the coal face. In addition to suppressing dust it reduces the risk of ignition of firedamp in the cut.

In the majority of cases the water is sprayed onto the cutting chain by jets located on the machine: i.e., outside the cut. However increasing use is being made of bars with internal jets which spray in all directions inside the cut. This type (Fig. 5) is often referred to as a "whale jib." It is particularly applicable in overcutting because it insures thorough mixing of the water and dust within the cut. A similar system also is used with curved bars and cutter-loaders. To prevent clogging of the jets in whale jibs, the supply pressure must be about 100 psi, and filters must be used in the individual water supply to the cutter.

Another method developed for simple arcwall machines where no piped supply is available, and also applicable to shortwall machines, makes use of a portable tank mounted on the machine. Sprays on both sides of the cutter bar are fed by a low-capacity pump driven by a belt off the motor coupling. This enables a supply of 2½ to 4 gpm to be delivered under suitable pressure. The tank is filled by hand pumping from water tanks sent into the district daily.

A most difficult dust problem arises when cutting is done in a dirt band, particularly when the band is above the floor level. At present many trials are being carried out in an attempt to find means of controlling this dust effectively. They include trials with whale jibs and combinations of whale jibs and external jets using water and water with wetting agent added, and also a variety of water quantities and pressures.

The most promising experiment, however, is one in which foam is used instead of or in addition to water. A special type of bar has been designed to feed the foam onto the cutting chain inside the cut. In one experiment, the foaming agent was added to the supply water in the gate road and brought to the machine through a flexible hose where a foaming device, using atmospheric air, produced 50 gpm of foam with an expansion of about 10.

These trials led to the development of a system in which compressed air is used to produce a foam with an expansion of about 40. The foaming agent is added to the supply water in the gate road through a device which insures a constant water pressure, and is led to the machine through a flexible hose. Another flexible hose carries the compressed air along the face to a foaming device on top of the cutter. In addition, this middle cutting bar is enclosed so that the wet cuttings leave the cut out of contact with the ventilation current and are conducted through a flexible tube to the floor.

Foam has suppressed the dust produced by middle cutting in this dirt band more effectively than any other method previously used. The experiments are continuing to see whether the foam and its method of application can be improved. Afterward, the trials will be extended to other seams.

Experiments are also being made to assess the practicability of ventilating the undercut using air-water (or mist) sprays.

Drilling

ROTARY V. PERCUSSIVE

Much has been done in the field on this question, but more recently controlled tests were carried out by the board's Mining Research Establishment with the following results: Dry rotary drilling of a 2.6-in-diameter hole at a penetration rate of 3 ft 1 in per minute produced an average dust concentration of 291 parts (0.5 to 5 microns) per cubic centimeter; dry percussive drilling of a 1.7-in hole at 2 ft 8 in per minute, an average concentration of 2,270 ppcc.

It is for this reason that rotary drills are preferred to percussive drills wherever practicable. Nevertheless, the re-

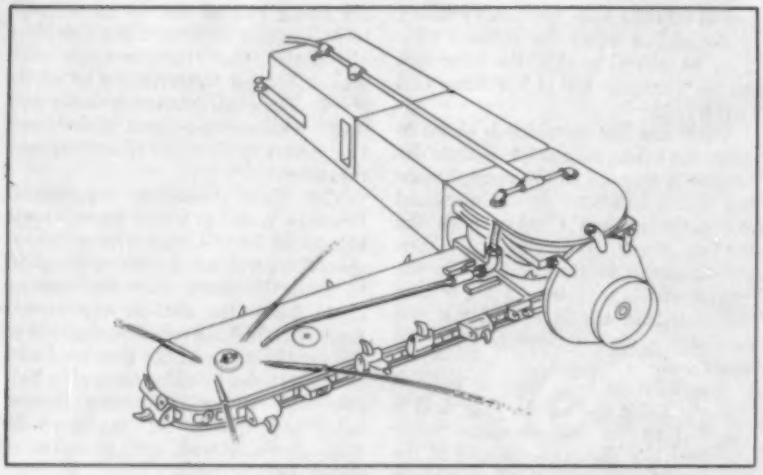


FIG. 5—EQUIPMENT FOR DUST SUPPRESSION during cutting includes the "whale jib" with sprays inside the cutter bar for more effective wetting.

FIG. 6—WATER COUPLING with diaphragm pump for wet drilling from tank supply.

FIG. 7—WATER-CONTROLLED drill on trial.

FIG. 8—DRY DRILLING FOR ROOF-BOLTING at Dosco, in Nova Scotia, with dry dust collection through the drill rod.

quirement of the Mines & Quarries Act to minimize the giving off of dust may require all drills to be equipped with a means for suppressing dust.

WET DRILLING

Developments in wet drilling have been centered mainly around equipment for extending its range of application. For example, the device shown in Fig. 6 (Siemens-Schuckert) was developed to enable wet drilling to be carried out in places where no piped water supply is available. It is a water coupling incorporating a diaphragm pump. It is inserted between the drilling machine and the drill rod, is driven by the drilling machine, and pumps the flushing water from a static tank. It delivers about 0.6 gpm and has been proved on test to effectively suppress the dust produced by drilling.

A water-controlled wet percussive drill (Climax, Fig. 7) also is undergoing trials. Initial results are very promising.

DRY DRILLING SUPPRESSION

The principle common to all dry suppression methods consists of collection or damping of the cuttings after extraction from the hole in an air stream induced by an ejector system. In some cases the cuttings are extracted at the mouth of the hole by a dust hood; in others, they are extracted from the point of drilling through the drill rod. Tests conducted by the Mining Research Establishment proved that this latter method of suppression can be as effective as the best wet drilling. A well known example of a drill using this principle is the Holman Dryductor (Fig. 8). Dry drilling is applied particularly to making holes for roof-bolting.

One interesting recent development is designed to enable the Dryductor to be converted to a wet drill for use in damp ground. The conversion can be effected in 2 or 3 min underground.

Roadway Suppression

In roadways along which men travel, the dust is suppressed by spraying, or by consolidation using calcium chloride or, less frequently, sodium chloride. On transport roadways, many factors must be considered. Principally, attention must be given to the design and maintenance of rolling stock, track, conveyors and transfer and loading points. Belt joints must be sealed and belt cleaning devices installed. These are preventive measures but, in addition, the coal on belts, in mine cars and passing over loading points must be sprayed with water. Even although good dust suppression

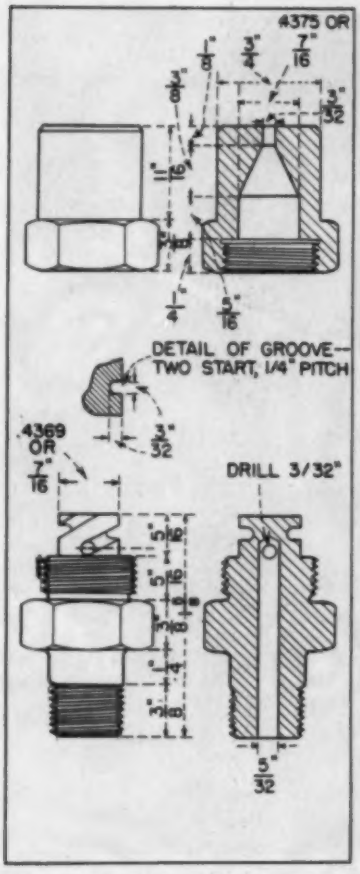
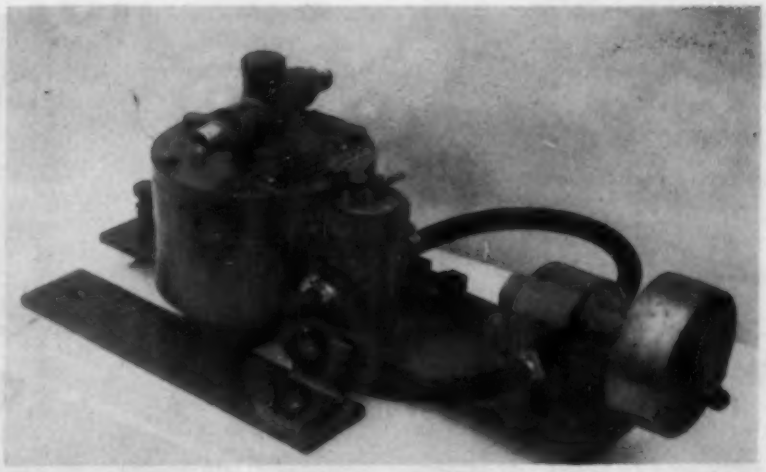
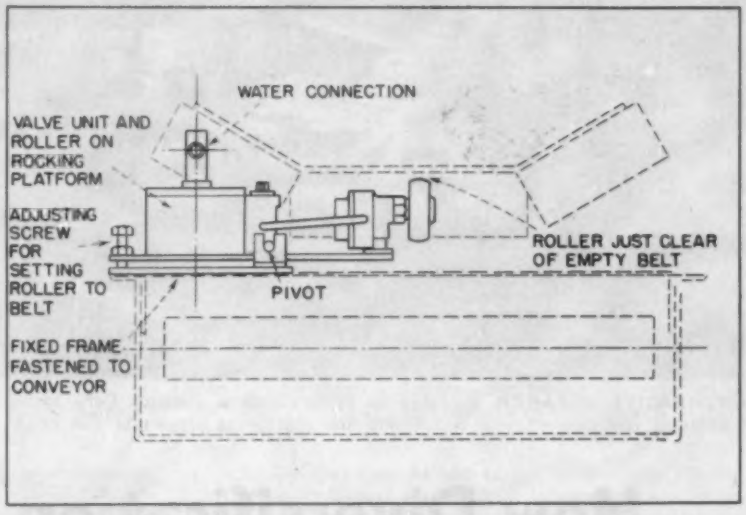


FIG. 9—NCB-DESIGNED SPRAY HEAD for a wide variety of jobs.




WATER CONNECTION
VALVE UNIT AND ROLLER ON ROCKING PLATFORM
ADJUSTING SCREW FOR SETTING ROLLER TO BELT
ROLLER JUST CLEAR OF EMPTY BELT
PIVOT
FIXED FRAME FASTENED TO CONVEYOR

FIGS. 10 & 11—BELT-ACTUATED SPRAY-CONTROL unit designed to turn water on only when belt is loaded.

is maintained on the faces, this spraying is often necessary to counteract the drying effect of the air current in the transport roadways.

Many varieties of sprays are in use for this purpose. Water pressures vary from less than 100 to over 500 psi. The most commonly used spray is one designed by the N.C.B. some years ago. Two sprays are available with different capacities. It is a simple inexpensive type (Fig. 9) which is used for a wide variety of jobs: over mine cars, conveyors, dumps, for spraying roadways and so on, and has proved an effective dust suppressor over a wide range of pressures. At the same time it is easily maintained.

During the past year controlled tests of many types of spray have been carried out at the Mining Research Establishment. The tests are being continued using high water pressures, and it is hoped to be able to judge from the results what types of spray are best suited to particular jobs. In the initial tests, however, the N.C.B. spray has again shown up very well.

Automatic Spraying

The difficulties of belt slip associated with spraying water on conveyor belts have always been present, but they increased with the advent of fireproof plastic belting. This has necessitated the development of devices for controlling the sprays so that they operate only when the belt is loaded. One of these (Clayton "Rollamatic") is shown in Figs. 10 and 11. A pivot-mounted roller is located under the belt and is connected to a small pump and valve. The valve controlling the spray water is actuated by the rotation of the small pump, which in turn operates only when the roller is actuated by the fully loaded belt. When the belt is running empty or is stopped, the roller does not operate and the valve closes. The apparatus is suitable for almost any width of conveyor and will operate on any water pressure up to 1,300 psi.

Acknowledgment—I wish to express my thanks to the National Coal Board for permission to publish this paper. Any views expressed are my own and not necessarily those of the board. I also thank the various manufacturers who supplied illustrations.

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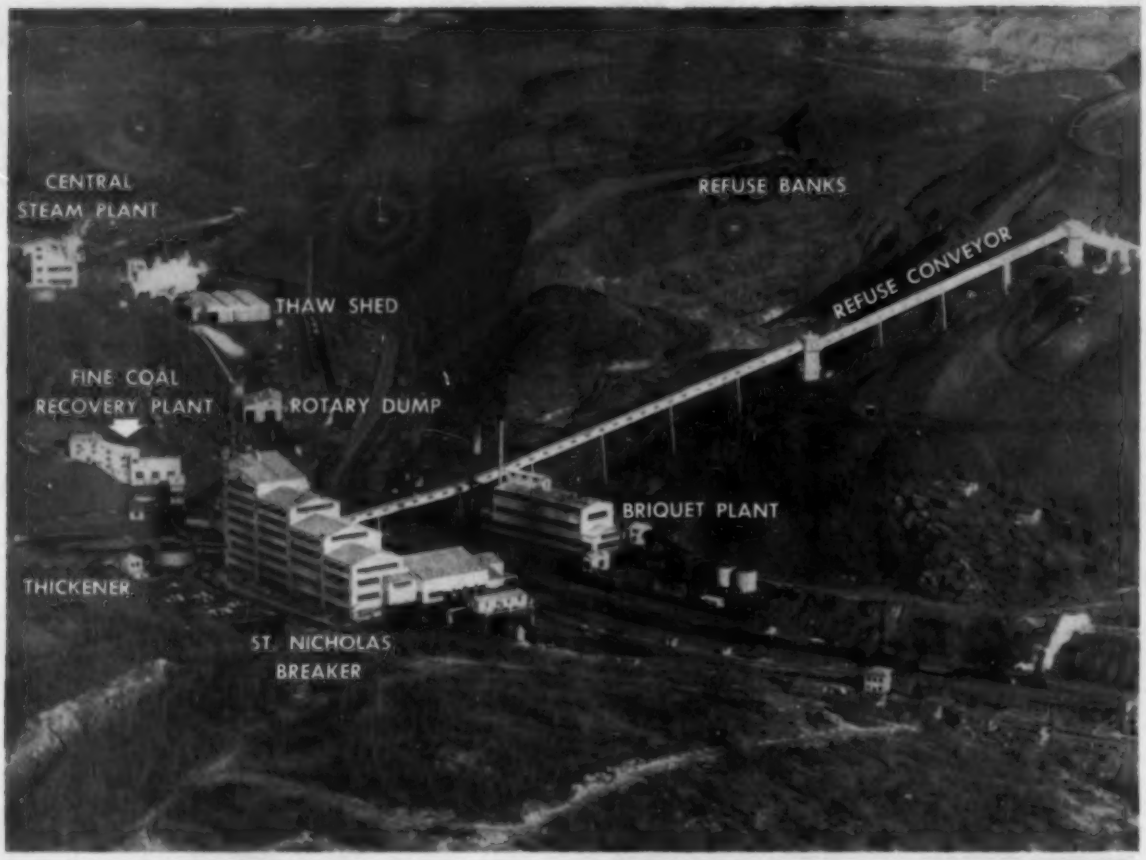


ANTHRACITE BREAKER, operated by Philadelphia & Reading Corp. at St. Nicholas, Pa., is the world's largest. The addition last December of a $500,000 fine coal plant arrow) is one phase of present growth which proves . . .

How Diversification Pays Off

By bold action, tempered with realistic planning and cautious optimism, the Philadelphia & Reading Corp. has converted a net loss of $3.1 million in 1955 to a net profit expected to exceed $8 million in 1956.

By W. A. RALEIGH, JR.
Assistant Editor, COAL AGE

DIVERSIFICATION, cost-cutting, and research and development—these are the basic ingredients of a success formula which has lifted one anthracite producer from the doldrums of despair to the top sales and production spot in the industry. That producer is the Reading Anthracite Co.—one of Philadelphia & Reading's trio of subsidiaries which also includes the Union Underwear Co. and the Acme Boot Co.

The Philadelphia & Reading Corp. lost $7.3 million in 1954 and $3.1 million in 1955. For the first 9 mo of 1956, P & R reported a net income of $5.7 million and earnings of $4.67 per share for its entire operation. The final year-end tally is expected to show profits, or net income, in excess of $8 million.

Corporation policy does not permit disclosure of how much each subsidiary contributed to 1956 profits. But all subsidiaries are termed "profitable operations." And, every month this year, P & R says its anthracite operations have been substantially in the black. Production rose from 3,690,152 tons in 1955 to an estimated 4,743,386 tons in 1956; in the same years, respectively, sales moved up from 4,512,972 tons, valued at $36,602,573, to an estimated 5,002,753 tons, valued at $41,505,752. These

figures put Philadelphia & Reading in the industry's top production and sales spot, taking over from Glen Alden which estimates 1956 production at 4,168,104 tons and sales at 4,260,402 tons.

Recovery Formula

P & R's recovery has been achieved mainly by:

1. Diversifying income through the purchase of two profit-making business enterprises – one turning out underwear, the other boots.
2. Cutting down large coal inventories and other overhead costs.
3. Developing new or growing markets, as steel and export.
4. Increasing production facilities for fine coal–much in demand by the steel industry.
5. Cooperating with the Pennsylvania anthracite production control act which sets output quotas, on a voluntary basis, for all major producers.
6. Pushing research and development of new uses for anthracite.

The recovery is also attributed, in no small degree, to the leadership and drive of P & R's new president, Howard A. Newman, and to the astute management of his first lieutenants: Roger M. Kelly, P & R's executive vice president; George J. Clark, president, Reading Anthracite Co.; Jack A. Goldfarb, president, Union Underwear Co.; and Sidney E. Cohn, president, Acme Boot Co.

Diversification and Cost-Cutting

When 34-yr-old Howard Newman assumed P & R's presidency Jan. 1, 1956, he faced much pressure to take the firm out of the anthracite business because of the depressed state of the industry. Part of the pressure also stemmed from the fact that P & R already had a taste of success from nonanthracite operations. On Sept. 1, 1955, under the guidance of Mr. Newman, then vice chairman of P & R's executive committee, the firm bought the Union Underwear Co.–a large, highly-specialized, modern enterprise producing 80 million men's and boy's underwear garments annually. The $15 million transaction resulted in "immediate and sizeable revenues."

Worth noting: P & R's cash outlay for the transaction–$2.5 million– was acquired mostly through the reduction of excess coal inventories. Of the $12.5 million balance, $2.5 million came from cash in the seller's treasury, $1 million from the delivery to Union Underwear of 50,000 shares of P & R treasury stock, and $9 million from non-interest bearing notes the payment of which was geared to a percentage of Union Underwear's future profits.

In spite of pressures to abandon anthracite, Mr. Newman charted his own course, firmly convinced that hard coal has a future. But this future, he was also convinced, could only be won by continuing to diversify and strengthen P & R's income position. Accordingly, during the past year, Mr. Newman took these steps:

1. Engineered a cost-cutting campaign which reduced anthracite overhead and operating expense at an annual rate of $1,250,000.
2. Strengthened the competitive position of Union Underwear by buying and equipping a $1,250,000 yarn mill in Alabama.
3. Directed the purchase of the Acme Boot Co. – a well-established concern turning out 9,000 pairs of cowboy and other popular boots daily from three plants in Tennessee. In negotiating the purchase, Feb. 24, P & R paid $1,500,000 in cash and made up the balance with non-interest-bearing notes the payment of which has been largely pegged to Acme's future profits.

Market Development

Diversification and cost-cutting have laid the financial basis for recovery of the total P & R enterprise. But the firm realizes that its future progress depends on the stability of each subsidiary. For the Reading Anthracite division, this means research and the development of new markets.

P & R's Skipper . . .

HOWARD A. NEWMAN, president, Philadelphia & Reading Corp., is among the youngest business executives in the United States to head a multi-million-dollar enterprise. He was 34 when the firm's board of directors elected him chief executive officer Jan. 1, 1956. By that time he had earned an enviable reputation as a business man and an investment executive.

Upon his return from U. S. Navy service in 1946, Mr. Newman invested the bulk of his savings in an export business of his own, fully realizing its potentialities at a time when the post-war world was starving for American goods and U. S. dollars abounded abroad. In little more than a year, his modest investment grew to six figure proportions.

In 1949, he joined the New York investment banking firm of Graham Newman when it was going through a period of rapid expansion. Here, Howard Newman became active both in the development of new investment opportunities and in the management of some of the corporations in which the firm had obtained an interest. It did not surprise his associates, however, that a man with Newman's drive would eventually wish to return to the mainstream of American business.

Among the imaginative steps taken during the first year of Mr. Newman's presidency of Philadelphia & Reading Corp. have been a revamping of the corporation's charter; a reorganization of the company's anthracite business with special emphasis on an active program of research and development; and the deployment of the corporation's working capital to acquire new interests, not necessarily related to the coal industry, but carefully selected to insure a substantial return.

P & R's First Lieutenants . . .

ROGER M. KELLY ("Mike"), executive vice president, Philadelphia & Reading Corp., is Mr. Newman's proverbial "right hand." His authority ranges over a wide variety of executive and administrative matters.

Prior to joining P & R March 1, 1956, Mike Kelly was a partner in the firm of Stewart, Watts & Bollong, where he was in charge of all accounting for, among others, the West Indies Steamship Lines and Textron, Inc.

During World War II, Mike entered the U. S. Navy, and received a citation for meritorious service. At the time of his discharge, he had reached the rank of commander.

Previous to the Navy duty, Mr. Kelly was associated with LaFrentz & Co., Certified Public Accountants, Baltimore, Md., for 4 yr and became a CPA in the State of Maryland. He started college at the University of Maryland and completed a major in commerce at the University of North Carolina in 1933.

Mike indulges in his hobby, golf (handicap: 11), on the course at the Southward Ho Country Club where he is a member. Other clubs include the New York Athletic Club and the Uptown Luncheon Club.

GEORGE J. CLARK, president, Reading Anthracite Co., graduated from Rensselaer Polytechnic Institute in 1933. Upon graduation, he joined the engineering department of Philadelphia & Reading Coal & Iron Co. and was appointed division engineer, Pottsville Div., in 1943. When the company organized the Shen-Penn Production Co. in 1946, he became its chief engineer and in 1947, its president. The anthracite executive was named general manager, Philadelphia & Reading, in 1951 and was elected vice president and general manager in 1954. He was named president, Reading Anthracite Co., Sept. 1, 1956.

Mr. Clark has been actively identified with many community organizations, serving as president of the Appalachian Trail Council, Boy Scouts of America. He is or actively has been identified with the YMCA, Community Chest, Schuylkill County Heart Assn. and the Greater Pottsville Industrial Development Corp. He is a member of the American Institute of Mining & Metallurgical Engineers, the Pennsylvania Society of Professional Engineers, the Pottsville Club and the Schuylkill Country Club.

JACK GOLDFARB, president, Union Underwear Co., started his own little underwear factory in Indianapolis, Ind., 31 yr ago. Since that time, he has lifted the company—now turning out 80 million garments a year—to the top of the male underwear industry.

At the start, Mr. Goldfarb was not in a lucrative field and his capital was limited. But, in deciding to concentrate on a one style garment made from one fabric selling at a single price, he immediately set his operation apart from contemporary merchandising policies.

While other companies struggled to avoid bankruptcy from sharply reduced sales during depression years, Goldfarb's policy of specialization, mass production and low prices paid off in expanding sales and a new plant at Frankfort, Ky.

In 1938, Mr. Goldfarb was able to secure the exclusive license on Fruit of the Loom products. Another landmark was the opening of a second large plant in Bowling Green, Ky., in 1941. Mills to knit and sew knit underwear are also now operating in two Pennsylvania towns and in Campbellsville, Ky. A newly-acquired yarn mill will be in full production early in 1957.

Steel and export are the hottest items on the market development agenda. P & R, however, looks with a somewhat cautious eye on the export market. The firm is not yet fully convinced that the present high level of industry overseas shipments (2,500,000 tons in '56 compared to 700,000 tons in '55) should be taken as a basis for long-range planning. Closer to P & R's heart is the drive to increase sales of "anthrafines," or fine coal, for sintering ores in steelmaking.

Reflecting confidence in the permanency and growth prospects of the sintering market, the corporation in December put its new $500,000 fine-coal recovery plant into full production at St. Nicholas, Pa. The plant has a capacity of 500 tpd from breaker

SIDNEY E. COHN, president, Acme Boot Co., decided in 1939 to produce cowboy boots in quantity and to market them at popular prices. This decision has made footwear history. "Americans are becoming more leisure-minded in time and appearance," Mr. Cohn states. "They like the convenience, rugged-wearing qualities, handsome styling and popular prices of boots."

It all began 17 yr ago, when Mr. Cohn toured the Southwest, exploring the market potential for cowboy boots. As a result, there now are three Acme plants located in Tennessee, turning out a daily production of 9,000 pairs. Besides the manufacture of ladies', men's, children's and infants' cowboy boots, Cohn has added to the line Wellington, majorette, and engineer boots.

Footwear making is nothing new in the Cohn family. For over 100 yr the family has been active in the business. Jessel Cohn, Sidney's father and founder of the firm, learned the trade at an uncle's factory in Bristol, England. He came to Chicago in 1886, where he established the Chicago Specialty Shoe Co. One other son, Marvin, is Acme's vice president in charge of sales.

feed alone and will be able to process larger quantities from huge silt banks nearby. "It is fair to assume that if this market develops as anticipated, P & R will take the necessary steps to increase capacity," Mr. Newman states.

Expected growth in the sintering market is based on this reported fact: When new low-grade taconite ores or the finest grades of Cerro Bolivar (Venezuelan) ores are sintered with anthrafines, coke economies can be realized, and blast furnace production can be increased as much as 18%. (In recent years, anthrafines—popularly considered as waste—have found limited and barely economical use in power plants.)

P & R figures that it is in an enviable position to grow with the sintering market. The firm owns some 40 million tons of anthracite silt—believed to be, by far, the largest holdings in the entire anthracite industry. These holdings are backed up by about 200 million tons of coarse refuse banks which could be used to produce further quantities of fine coal.

Great importance is attached to the silt and refuse banks because the production of fine coal from breaker operations is economically unattractive to supply a large demand. Prepared hard coal sells for $10 to $16 a ton, while fine coal now sells for $5.50 to $6.50 a ton. Since no company is interested in grinding $15 coal to get $6 coal, the prospects of increasing anthrafines output, beyond that normally resulting from current hard coal production, are virtually non-existent.

Research Program

P & R has pinned its research hopes primarily to a gasification project costing $500,000—said to be the largest research investment ever made by an anthracite producer. The project aims to develop a process for making gas from unbeneficiated anthracite silt. This has already been proven technically feasible in a pilot-plant operation.

Behind the push on gasification: "It has been definitely ascertained that a potentially large market for hydrogen and synthesis gas exists in the anthracite region and its vicinity." (Ed. Note: Cost-saving advantages in the direct reduction of iron ores with hydrogen gas may help solve the steel industry's most pressing problem—the high cost of expanding capacity at today's prices. See *Coal Age*, May, 1956, p 57.)

Following the success of the pilot-plant operation conducted by Hydrocarbon Research, Inc., P & R gave the same firm the green light to build and supervise a semicommercial plant at Trenton, N. J. This plant is due "on stream" in March or April of this year.

By the end of 1957—or after the semi-commercial plant has operated about 6 mo—P & R expects to know the economic score on gasification. If the Trenton plant proves that anthracite silt can compete commercially with other sources of hydrogen and synthesis gas, the firm plans to enter into commercial production.

Automatically, success of the plant would upgrade the dollar values of P & R's many millions of tons of anthracite silt accumulated over the decades. But, Mr. Newman is not one to count his eggs before they're hatched. Instead, he prefers to comment:

"Without the underwear and boot investments, we might not have had the courage or inclination to go ahead with the gasification project." And, he adds: "The gasification project could well lead us into other projects in the chemical field."

Outlook for 1957

Mr. Newman looks at anthracite's prospects in 1957 with guarded optimism:

"The general outlook for anthracite production in 1957 is better than it has been for some time.

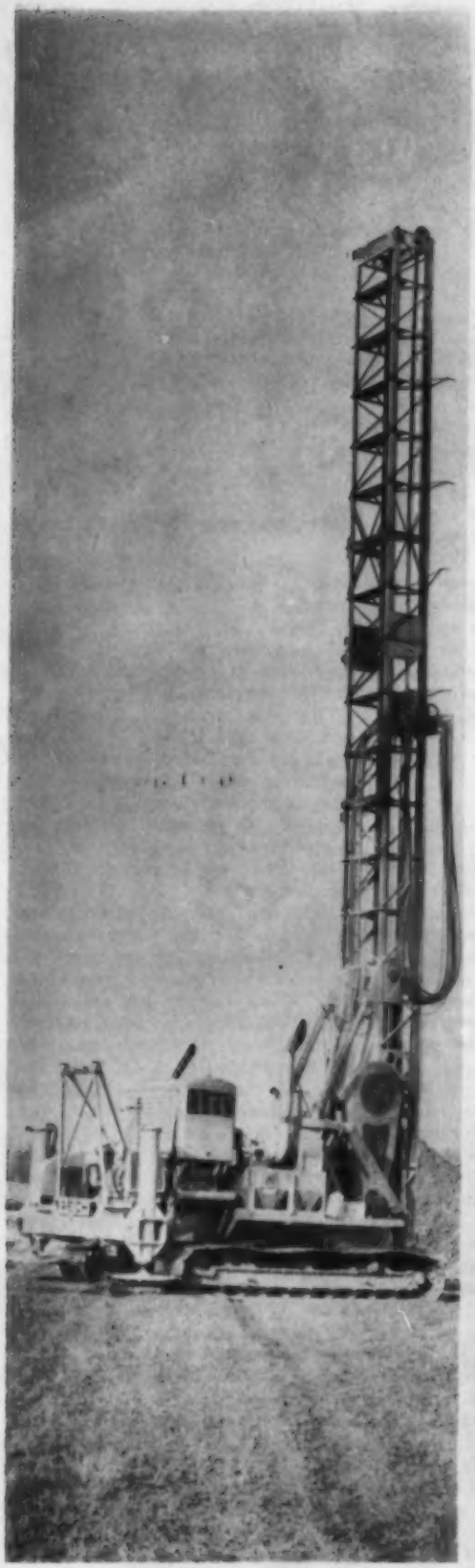
"But whether it will amount to a reversal of the loss trend for the industry as a whole, only time will tell. In anthracite, we do not have the possibility of increased productivity which coupled with increased demand, has brought about so startling a reversal of the downward trend in the bituminous industry.

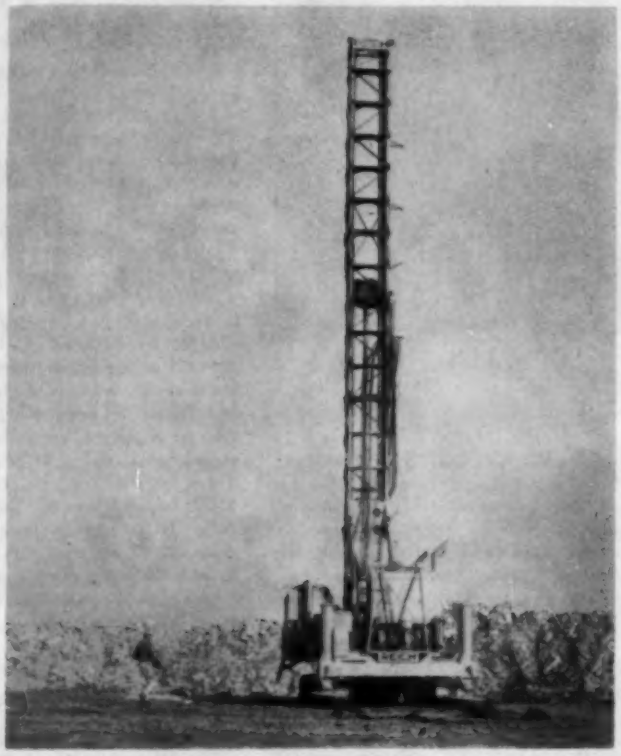
"Through strenuous efforts, Philadelphia & Reading Corp. has been able to reduce operating and overhead expenditures related to its coal business at an annual rate of about $1,250,000. However, under the terms of the new anthracite wage agreement, effective Dec. 1, 1956, the savings will be more than offset by increased costs of production.

"The only way in which we can continue to reap the benefits of the savings which we have effected in our operating and overhead costs will be through increased realizations from the sale of our coal. Whether or not this can be done successfully depends on the effect of competition from other fuels, as well as competition within the anthracite industry itself. It is too early to say in just what way this problem will finally be determined.

"However, measured in terms of the efficiency of its operating personnel, the nature of its coal and its financial resources, we feel that Philadelphia & Reading Corp. should have no problem in staying well ahead of the parade."

New Drill Helps





BIG DRILL broke bank-preparation bottleneck. Features include constant bit pressure regardless of rock hardness, 55-ft mast and all-hydraulic operation. Machine can drill close to edge of high wall without danger of tipping over. Two men drill an average of 1,200 ft in a shift.

DRILLING AND BLASTING are closely coupled. Drill helper charges completed hole as operator sinks another.

Tasa Dig Deeper at Bortz

Rotary drill sinks 50-ft hole without stopping.

18-cu yd shovel replaces two 6-cu yd draglines.

Flexible coal loading smooths mining cycle.

Automatic water neutralizing saves manpower.

HIGH-CAPACITY DRILLING, well-coordinated stripping methods and close supervision are the basic ingredients that are blended for smooth operation at Tasa Coal's Bortz mine in Venango County, Pa. For the past 1½ yr the 2,500-tpd Bortz mine has gradually been redesigned to handle thicker and tougher overburden.

There were two major goals in the redesign program. First, Tasa wanted to move overburden more economically because stripping units were reaching their economic limit. This problem was solved by replacing two 6-cu yd draglines with an 18-cu yd Marion 5323 shovel. But soon after the shovel went to work the mining cycle was thrown out of balance because the overburden drills could not keep pace. The second problem then was to match drilling capacity to stripping capacity and at the same time cut drilling costs.

Since two truck-mounted rotary vertical drills could not keep pace with the 18-yd shovel, Tasa looked for a large machine that could do more work than the smaller units. In the new machine the company sought a drill that could sink a 50-ft hole with only one drill stem and work close to the edge of the highwall. With these basic needs set up the company asked Reich Bros. to build the machine. The result was the birth of the Reich Model C-700-45 drill.

Shortly after the new drill went to work in May, 1956, drilling no longer was a bottleneck. With the new machine, it is now done only on the day shift. Two men do all of the work and at times the machine may be idle for a shift because drilling is well ahead of stripping.

Two men drill an average of 1,200 ft in one shift. In addition, the drill helper charges the blastholes with explosives. During a test run of 24 holes, 855 ft was drilled in 3 hr and 36 min. This averages out to 238 fph.

DRILL FEATURES

Features of the new drill include hydraulic power for all motions; infinitely variable speed rotation between 0 and 152 rpm; automatically controlled constant pressure on the drill bit; hydraulically powered crawlers that can be driven in opposite directions at the same time for fast moving; and a 55-ft mast that makes it possible to drill a 50-ft hole without stopping. The machine also is designed so that holes can be drilled close to the bank without danger of the drill tipping over.

WHERE THE DRILL WORKS

Tasa's Bortz mine is in the Brookville seam which averages 36 in. From the surface down, the overburden is made up of 10 ft of earth and soft shale, and 30 to 40 ft of sandstone. Sometimes there is a layer of shale over the coal and the sandstone is correspondingly thinner.

Tasa's entire operation must run smoothly because the average pit length is only 2,500 ft. Working 24 hr per day and 6 days per week, the 18-yd shovel travels the 2,500 ft in 9 working days, taking an average width of 75 ft. Thus with drilling, stripping and loading taking place in this relatively short distance, all equipment must mesh smoothly if production is to be uniform.

DRILLING AND BLASTING

The drilling pattern and pit width varies with the thickness of the overburden. For example, if the cover is about 40 ft thick the pit width is 45 ft. Blastholes are drilled on 21-ft centers in rows 15 ft apart. If the cover is 28 ft the pit is widened to 55 ft. Drillholes are then sunk 21 ft apart in rows 18 ft apart. Three rows of holes are drilled in each cut with holes in alternate rows staggered.

Tasa's new drill is fitted with a 6¼-in Gruner oilwell-type bit. An average bit cuts 4,000 to 6,000 ft of blastholes before it is worn out. Bits lasted only for 1,500 to 2,500 ft on the smaller truck-mounted rotary drills. Thus bit cost has been cut considerably.

As soon as a blasthole is completed the drill helper charges it with explosives. Holes are charged with 5x22-in cartridges of powder. The explosives used are a special bulky powder that permits full column loading to within 8 ft of the top of the rock, yet does not overcharge the hole.

Holes in the outer row are charged

STRIPPING SHOVEL with 18-yd dipper sets the pace at Tasa's Bortz mine. Unit stacks spoil 75 ft high while uncovering 55-ft strip of Brookville coal.

FLEXIBILITY in coal loading is provided by two shovels working in separate areas. One loads semi trailers (above) hauling direct to customers. Large trucks also are used for stockpiling.

Flexibility in loading keys smooth operation at Tasa

SECOND SHOVEL loads 10-ton end-dump trucks from other section of pit. Average haul to preparation plant is 3,000 ft.

LAND RECLAMATION completes the mining cycle at Tasa. These three bulldozers fill and smooth mined areas on a six-day basis.

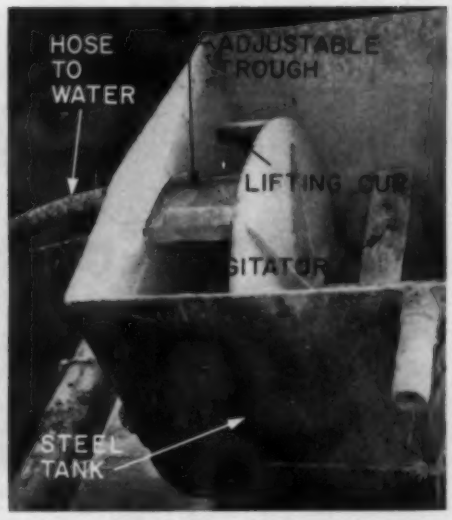
with 75 lb of explosives, holes in the center row with 100 lb and those in the inner row with 125 lb. Instantaneous caps are used in the first row and American 10MS delay caps in the other two rows. The delays permit the explosives to work more efficiently and break the overburden better. They also reduce vibration and thereby eliminate complaints from surrounding home owners.

Blasting is done only on the day shift and no more than 15 holes are detonated at one time. Two or three charges are set off in a shift and when mining approaches a house only 6 to 8 holes are detonated at a time.

LOADING AND HAULING

To add flexibility to loading, the company uses two coal-loading shovels. A Marion 93M with a 3½-yd Esco bucket normally works behind the strip shovel and loads out a 55-ft strip of coal. A fleet of 10-ton trucks haul this coal 3,000 ft to the preparation plant. A 20-ft berm is left along the highwall for a truck road. A Northwest No. 6 diesel shovel with a 2½-yd Esco bucket works ahead of the stripper in the previous cut so the shovel will have spoil room. The Northwest unit loads into a fleet of 18-ton semi-trailers that haul raw coal directly to the customer.

When the stripping shovel is within 500 ft of the end of the pit, the operation must click with machine precision to prevent delays when the stripping shovel turns around. As the stripper approaches the 500-ft mark the 93M coal shovel is moved ahead



AUTOMATIC low-cost treatment of acid water is done with this device developed by H. D. Letts, general superintendent. Power-agitated lime solution is delivered to acid water near suction line of sump pump.

Automatic device provides low-cost water neutralizing

TASA KEEPS A SHARP EYE on the accumulation of water around the strip pits to prevent acid water from entering the water sheds of surrounding streams. Six sumps each with its own pump are strategically located on the property. Each pump has a separate automatic treating tank. Before water is pumped from any of these it is treated automatically with lime solution. Water then is delivered to a settling area where the solids settle out before the water drains to the streams.

Over the past several years the company has learned that adding lime to the sump by hand is not satisfactory. The lime enters the sump in a big glob and usually sinks to the bottom without reacting with the acid. The result was that lime was wasted and one man had to be stationed at each sump.

An automatic system for effectively adding lime solution to the sumps was developed by H. D. Letts, general superintendent. Here is how it works. A steel mixing tank at each pump is partially filled with water and 400 lb of hydrated lime is added. As the lime enters the tank it is thoroughly mixed with the water by a power-driven paddle. A 3-hp motor drives the paddle through a speed reducer.

Lifting cups attached to the arms of the mixing paddle pick up the solution at one end of the tank and discharge it into an adjustable trough at the top of the tank. The trough leads to a 2-in hose that carries the lime solution to a point adjacent to the suction line. As the solution flows into the acid water it is pulled into the suction line of the pump. In the short journey to the pump and in the pump itself the solution has a chance to mix thoroughly with the acid water. The neutralized water is delivered to the settling pond at the rate of 90,000 gph. A tank of solution lasts each pump for 2½ to 4 hr, depending on the acidity of the water. The quantity of lime solution flowing into the sump is controlled by moving the adjustable trough back or forward. The closer it is moved to the lifting cups on the paddle, the more solution it will receive. When it is moved away part of the solution drops back into the tank. Tests are made each day to check the neutralized water. To meet the standards set by law, the pH value is kept above 7.

One man can service four pumps and solution systems with ease. When lime was added by hand, one man was stationed at each pump and the treatment was not nearly as effective. Most of the pit pumps are run two shifts per day while sump pumps usually are operated only by 3 hr each in a 24-hr period.

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to a loading position immediately behind it. This is done so that the stripping shovel will have spoil area as it turns around and starts the return cut. As a further precaution against delays while the turn is made the company sometimes uses the semi-trailer trucks to stockpile coal near the preparation plant. This is done if the machine reaches the turn at a time when the cleaning plant is not running, such as, at the end of the week.

A bulldozer works in the pit with the stripping shovel to remove the fine material missed by the shovel. The dozer operator also directs the steering and leveling of the shovel when it moves. A Caterpillar motor grader is available for smoothing pit roads and cleaning the top of the coal. Final cleaning is done by hand.

POWER

Power is delivered to the property at 25,000 v and is stepped down to 4,160 by a bank of three 300-kva General Electric transformers. Power reaches the stripping shovel over a combination of pole line and cable. The main pole line parallels the pit and is 1,500 ft back from it. Spurs on 800-ft centers lead from the main line to within 500 ft of the highwall. Then 1,000 ft of cable carries power the remaining distance to the shovel. The cable is joined to the pole line

PREPARATION PLANT features jig washing, freezeproofing and bin storage. Coal is hauled from plant by truck.

TASA SUPERVISORS include Q. E. Hefferman (left), pit foreman; H. D. Letts, general superintendent; and E. E. Martin, superintendent.

with a socket connector that prevents accidental reversal of rotation when the cable is connected to a new lateral.

To simplify cable handling in the pit the company made a skid-mounted boom for suspending the cable over the highwall. The boom extends far enough beyond the highwall to permit trucks and dozers to pass between the cable and the rock. Thus there is no need to build bridges over the cable or support it on hangers. When the cable is moved to a new lateral and moved along the highwall a bulldozer simply hooks onto the boom skid and pulls the cable to the new site. The cable does not scrape and bounce against the sharp rocks of the highwall and therefore damage is kept to a minimum.

LAND RECLAMATION

When the coal has been removed from a area and equipment is no longer moving about, Tasa starts its backfilling program. Three bulldozers, an International TD24, Caterpillar D9 with turbocharger and D8, are assigned to the reclaiming job. These machines work on the day shift, six days per week, smoothing and rounding the spoil so that it will support vegetation. The Pennsylvania law requires that the top of the coal be covered by 3 ft of dirt and the spoil be sloped on a 45-deg angle However, Tasa goes further than this and smooths the ground to blend with the undisturbed land.

PREPARING THE COAL

Trucks discharge coal into a double bin at the preparation plant. Independent feeders under each bin permit blending before the coal passes to the plant. Blended coal then flows over a bar screen that removes the plus 3-in material. The oversize is reduced to 3x0 and discharged onto a 24-in belt that elevates it to two Jeffrey 5-ft diaphragm jigs operating in tandem.

Clean coal passes over a 5x16-ft Allis Chalmers double-deck dewatering screen and is split into 3x5/16, 5/16x ½mm and ½mmx0 fractions. The 5/16x ½mm is further dewatered on a 4x6-ft Jeffrey Traylor vibrator.

Washed coal travels to two storage bins on two 24-in belts. One of the bins is divided into three 50-ton compartments and the other is separated into two 50-ton sections. The 3x5/16 and 5/16x½mm can be combined at the 100-ton bin to make a nut-and-slack product. Over the 150-ton bin there is a shaker screen that is used to make stoker, nut and egg sizes. Coal is freezeproofed with calcium chloride on the clean-coal belt as it flows to the storage bins. A Syntron vibrator distributes the calcium chloride to the coal.

All of Tasa's output is hauled from the cleaning plant by truck. Therefore storage facilities are an important part of the preparation plant. In addition to the 250-ton capacity in the plant there are clean-coal storage areas close by. As mentioned previously, raw coal also is stockpiled at various times when the stripping shovel reaches the end of the pit. A P&H 655 with a 1½-yd dipper is used to load the stockpiled coal into trucks. With the combination of bin storage and stockpiling the company is able to provide customers with coal without delay.

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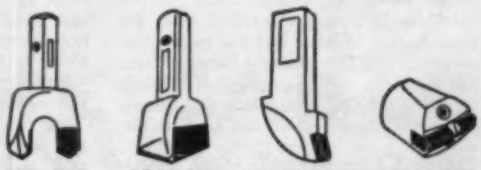


FOREMEN'S FORUM

MEETINGS AMONG LOCAL MANAGERS and mine committeemen can be orderly and productive when misunderstandings are prevented through good communications. Safety and economy advantages also result.

Improving Local Communications Between Management and Labor

Extreme care in handling every complaint is required to forestall local labor-management friction.

Here are some tips on steps you can take from a man who has responsibilities much like yours.

By THOMAS A. KING, Safety Inspector
Emerald Coal & Coke Co., Clarksville, Pa.

NO ONE QUESTIONS the improvement in recent years of communications between management and labor on the local level. This has resulted from the organization of labor and the consequent meetings and interchanges between local management and local union officials. There is no doubt that at a great many mines this improvement has gone no further than having meetings to settle controversies. It is our purpose to suggest ways to improve these communications and to point out the advantages of such improvements to management and labor alike. In this connection, the term management refers to the plant manager or superintendent and his staff, and the term labor refers to all the other workers in and about the mine who constitute the rank and file of the union local of that particular mine.

From a paper presented by Mr. King at 70th annual meeting of Coal Mining Institute of America, Pittsburgh, Pa., Dec. 13, 1956.

HAZARDS OF POOR COMMUNICATIONS

Let us see now how one of our communications might work out:

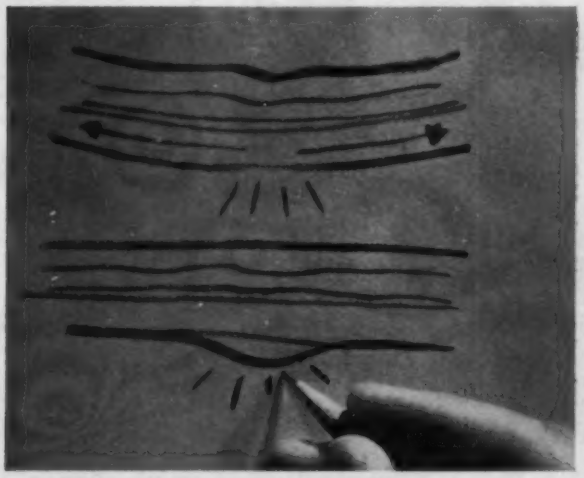
John Smith is a better-than-average timberman. He sets his timbers good and tight and in line with approved standards for the mine. He keeps up his end of the work cycle and works every day. His boss has no worries as far as John is concerned. He knows he can depend on him. In fact, the boss worries so little about John that when he needs a helper on a machine, he never thinks of John. But John Smith gets to thinking that he would like to have the job—more pay, certainly, and apparently less work. So he asks his boss about it. The boss, of course, does not want to lose John as a timberman, so he tells him he has had no mechanical experience, doesn't know a nut from a bolt and, in his opinion, would make a hell of a machine helper. He is too old, might get hurt.

John broods over the matter for a few days and decides to take his "gripe" to

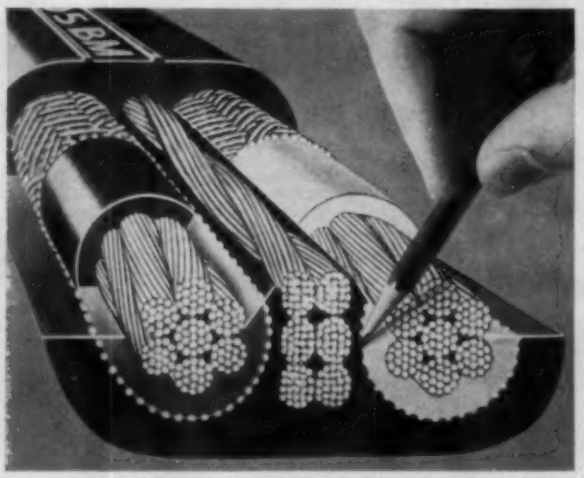
Rome's shuttle car cable can't be bent the wrong way!

JUST *TRY* TO BEND IT THE WRONG WAY. Force a length of Rome 60 Parallel Duplex to bend along its major axis—*if you can!* You'll discover that you can't put a damaging wrong-way bend in this tough cable—and neither can obstructions on the floor of your mine.

NO DAMAGING BEND—JUST A *FLIP-OVER.* When flexed in use, Rome's Duplex flops over and bends on its minor axis. Its interlocked construction forces the change and causes a flip-over, not a breakdown. This means that the power keeps coming through, and your coal production remains high.



WHAT HAPPENS TO *OTHER* CABLES. Wrong-way bends on ordinary shuttle car cables often cause conductors to slip, causing distortion. One side of the cable may stretch, the other crimp. Result: *a weak spot.* Further flexing, tension, or twisting turns the weak spot into a breakdown. Coal production then falls behind.



WHY ROME'S DUPLEX BENDS THE RIGHT WAY. Open braid around each insulated conductor forms a crisscross tread-like surface—one that won't slip. The tough Neoprene jacket and braided conductors, meshed together, bend just one way. The interlocked construction assures the right bend, and power keeps coming through.

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a mine committeeman. He wants to make his case strong so he tells the committeeman that when he asked for the job, the boss cussed about it and said "No!"

The committeeman takes the case to the whole committee and tells them that when John asked a favor, the boss gave him a cussing out. The committee takes the case to management in a meeting as a boss-cussing-out-a-worker case, and may supply some additional cuss words to strengthen their case.

Now management knows that the boss in question is not at all profane, is a member in good standing of a local church, and never has been known to use language of the sort reported. This may lead to references to other foremen who are admittedly profane. Management admits and agrees with the committee that cussing-out workers should not be tolerated and that proper directives shall be issued. In the meantime, John Smith and his request for advancement have been lost sight of.

You might think it would be very improbable, for one reason or another, that a situation such as the foregoing should exist. But we all know from our own experience that stranger things have happened.

FOSTERING BETTER LOCAL COMMUNICATIONS

The agreement with the union stipulates that a worker should take any grievance to his immediate foreman. If not satisfied there, he then should take the matter up with the mine foreman and superintendent in that order before he approaches his mine committee. Management should not accept or consider any case brought to it by the mine committee unless it has already been submitted to the foreman, mine foreman and superintendent.

The main point is this. The foreman, mine foreman and superintendent should make a written memorandum of each grievance, no matter how unimportant, presented to them by a workman, stating the facts as they see them. This could be contained in a memorandum form which would be initiated by the foreman and finally filed for future reference by the superintendent after he and the mine foreman have added their notations. This could be helpful to everybody concerned.

The same thing is true of the safety committee. Workmen frequently report to their safety committee conditions which they deem hazardous. The safety committee goes directly to the mine foreman or superintendent when the matter could have been taken care of by the section foreman on the job easily and quickly if the workman had gone directly to him in the first place. As a matter of fact, any section boss would prefer that his men do just that. Here again the foreman should make a memorandum of the report and what he did about it and forward it to the superintendent through the mine foreman.

SAFETY ASPECTS

Let us look at another example of poor communications:

Joe Doak is a fairly good worker. He is steady on the job and willing to do most anything. His boss likes him and would consider him perfect but for one thing. Time and time again he will catch Joe not wearing his safety goggles when digging, shoveling or pounding. He has warned him repeatedly. He doesn't want to send Joe to the mine foreman because he really likes the fellow, but he doesn't want to be charged with an accident and he doesn't want Joe to lose an eye.

Why doesn't Joe wear the safety goggles? Maybe they don't fit him quite right. Perhaps he feels uncomfortable when wearing them. To come right down to it, Joe probably feels that the goggles impair his vision and increase rather than decrease the hazards of his work. So the boss lets the situation drag on to the inevitable result. Joe sustains a disabling eye injury and the foreman is charged with a lost-time accident. It is needless to ask what's wrong with this picture. It is also pointless to say what should be done with the boss. The true facts will not come out. "Just a routine accident," everyone will say. "Too bad he didn't wear his safety glasses?" But it's wrong, terribly wrong.

Most any one who has bossed in a mine for any length of time will remember cases which were very much like Joe's. But no one will dispute the fact that faulty communications are the basic cause. If this man had been sent to the superintendent via the mine foreman in the first place, one of those officials, upon talking the matter over with Joe, would probably have made the necessary recommendations so Joe could wear his goggles and do his work. Or, they might have found that Joe was just plain contrary and then and there could have taken proper steps to bring him to his senses.

The report or memorandum forms, could be used in this case. It could be made of simple form in three copies, one for the workman, one for the superintendent via the mine foreman and one to be retained by the boss. It would be a half-size standard page and made in tablet form so a boss could carry it in his pocket. Its proper use undoubtedly would eliminate considerable misunderstanding and promote safety, economy and fair treatment in the mine.

ECONOMY ASPECTS

The goal of local management is to produce the greatest quantity of quality coal at the lowest possible cost with the fewest accidents. One of the most important factors in reaching that goal is the attitude of labor. Management creates this attitude, good or bad. To the mine worker and to the community in which he lives, local management is the company. From it, the workman forms his impression of the company and its policy, the company's attitude toward such factors as safety, production, absenteeism and labor relations.

Better communication between management and labor should improve the attitude of the mine worker. The principal reason for a bad attitude of a workman toward management is misunderstanding, and hence mistrust.

Labor's goal should be the same as that of management, but does the employee see that? A man frequently spends his entire working life at one mine. The successful operation of the mine may be due to him and others like him. He should feel, in a sense, that he is a co-operator of the mine and an important factor in its operation. The mine is his livelihood and should constitute a part of his life. Management can help itself considerably by getting this attitude across to the workman by bulletins and through daily contact of the bosses and workmen.

One of the greatest misconceptions of the labor family is that the company, as represented by local management, has limitless resources. Some men will appropriate to themselves anything, no matter how small or petty, that belongs to the company, and at the same time fiercely resent implications of their being dishonest. Understand, now, I don't mean all the men, but quite a few of them at that. Not so long ago I stopped a fellow going out of the mine with a very heavy dinner bucket. Examination proved it to be full, both center and bottom, of sixpenny nails which he was attempting to pilfer from the company!

This same misconception is frequently responsible for the waste of materials commonly used from day to day in the mine. Articles such as drill bits, augers, pressure hose, water hose and necessary fittings, files, tape, pipe fittings and respirators are very expensive, especially when used in such great quantities. The men get these items on order from their foremen and apparently have little idea of their actual cost. Display cases of such supplies with price tags attached in plain view, placed where workmen congregate before their shift goes into the mine, would open the eyes of quite a few men as to what these various items actually cost.

The fact local management should get across to labor is that their productivity is the key factor in the successful operation of the mine. In recent years, labor has received a good many raises in pay and other benefits which, of course, have directly increased the cost of production, but if the production per man did not increase in line with wages, the benefit of the pay increases would be nullified by rises in the cost of living. The fact that living costs have not kept pace with the rise in wages has been due to the introduction into the industry of better machinery, thereby giving the mine worker better tools.

In conclusion, then, inasmuch as the main objectives of local management and labor coincide, it behooves them to co-operate as much as they possibly can. Management should, of course, take the initiative and as far as possible indoctrinate and properly demonstrate to the labor family through its contacts with the local officials and committees and the rank and file at work that what is good for one is good for the other. Better communications will result in better understanding and mutual trust.

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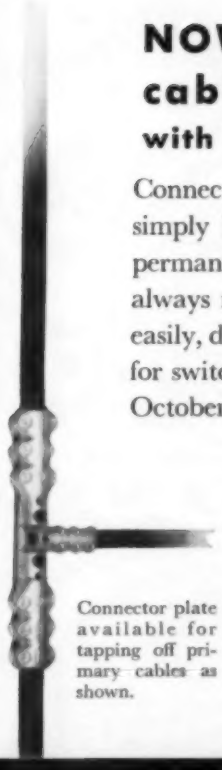

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Independent laboratory tests prove that porous structure of Spencer product develops more effective and higher speed blast.

Because ingredients cost less, and the mixing process is so much simpler, blasting costs can be cut up to 50% by using Spencer Prilled Ammonium Nitrate. At the same time, this product produces better fragmentation, yielding up to 25% more material.

The basic ingredient is Spencer Prilled Ammonium Nitrate. Impartial laboratory tests have now proved that the porous structure of these prills makes them the most effective and highest-speed blasting agent of any manufactured nitrate solid. This conclusion has been further verified by extensive field tests.

More even distribution made possible by the prills is one important reason for the superiority of Spencer Prilled Ammonium Nitrate. And, since the deflagration of a solid explosive is layer by layer from the surface of the particle, the additional surface available on the prill speeds up decomposition.

Contrary to popular opinion, the lesser bulk density of prilled ammonium nitrate actually *increases* rather than decreases the energy of the explosion. This fact is verified, not only by such an authority as the ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY, but also by comparative field tests. And more intense explosion means better fragmentation.

Not explosive in its normal form, Spencer Prilled Ammonium Nitrate can be handled safely, and because the mixing operation is so simple and safe, it can be done right at the mine location.

As supplier of the original nitrate used in the early stages of developing the Akremite Blasting Process, Spencer Chemical Company has been closely associated from the very beginning with this project to create less expensive blasting techniques.

For more specific information about low-cost blasting for coal, iron, limestone or construction, write to Spencer Chemical Company. We will be glad to supply you with any needed technical assistance or service.

SPENCER CHEMICAL COMPANY

610 Dwight Bldg. • Kansas City 5, Mo. BAltimore 1-6600

OPERATING IDEAS

Belt Saddle at Loading Station Easily Moved

MOVING loading stations is a job that must be done frequently in continuous mining. Here is a device made by the Old Ben Coal Corp., Benton, Ill. to speed the moves. The hopper-like device straddles the rope belt conveyor at No. 9 mine and clears the moving belt. Three pipe supports spaced along each side support the saddle on the two ropes. Each of the pipe supports has a slotted member at the end to fit over the belt. Thus it cannot slip off. The company reports that the device can be moved to a new loading station in a matter of minutes.

Hand-pulled Rockduster Serves Continuous Mining

ROCKDUSTING on shift is simplified with this lightweight hand-pulled rockduster at the Old Ben Coal Corp. The chassis was designed and built in the Old Ben shop. Components include two light car axles with pneumatic tires and a channel frame joining them. An MSA Bantam rockduster is mounted on the chassis. As soon as the continuous miner moves out of a place, the unit is pulled in and the place is rockdusted to the face. Thus rockdusting always can be kept up to the face with a minimum of effort.

Metal Drag Speeds Cable Handling

MOVING power cable to a new pole-line connection on top of the highwall is speeded with this metal drag. Cable is looped over the cylindrical part that is welded to a square base. A dozer hooks onto any one of the four sides of the base and pulls the cable 800 ft to a new connecting point. The drag prevents sharp bends in the cable which can be looped over it very easily. As the drag is pulled ahead, the leading part of the cable is kept off the ground. Thus the cable is not likely to foul on a rock.

CONVEYOR BELTS

"Getting coal from the mining machine to the main haulageway used to be one of our main problems," says an executive of Old Ben Coal Corporation. "Then we installed an extensible system of conveyor belts. This eliminated the time-consuming job of continually moving the pit car and putting down and pulling up railroad track to keep up with the mining operation."

Long known in the coal industry as a progressive outfit, Old Ben chose U. S. Conveyor Belts because of the good job they were doing in their preparation plants above ground and because of the belts' proven performance on extensible conveyor systems.

These belts have made a hit with Old Ben officials in every way. Output has gone up 10% and the belts are practically maintenance-free.

This extensible conveyor* has idlers suspended from wire ropes. The 36" U. S. Giant® MineHaul Belt (Style EN) in use here, provides just the right amount of flexibility to complement this new extensible conveyor system. The belt's resiliency and troughability keep it perfectly trained all the time.

For any materials handling problem, there is a "U.S." belt—plus expert engineering assistance—available at any of the 28 "U.S." District Sales Offices, at selected "U.S." distributors, or write us at Rockefeller Center, New York 20, N. Y.

In Canada, Dominion Rubber Co., Ltd.

*Manufactured and patented by Goodman Mfg. Co.

Mechanical Goods Division

United States Rubber

Boom Eases Job Of Handling Cable

IT'S EASY to move power cables at Tasa's Bortz mine with this skid-mounted boom. Cable handling in the pit is simplified and the cable does not scrape against the sharp rocks along the highwall. Another benefit is that trucks or bulldozers can pass between the cable and the highwall and therefore no special cable supports or bridges are needed in the pit. The boom and sheave were salvaged from an old shovel and mounted on a steel base. Ballast in the skid-mounted base prevents the boom from tipping over.

When the shovel reaches the end of the cable, a bulldozer hooks onto the base and pulls the boom ahead. It takes the dozer only a few minutes to move the boom and it is done without delaying the stripping shovel.

Belt Winder Speeds Belt Recovery

THIS SKID-MOUNTED power winder is simplifying belt recovery at the Awaba Colliery, New South Wales, Australia. The idea for the machine was born after 56 man-shifts were spent rewinding 3,000 ft of belt by hand. It now takes only 2 hr to do the same job with the power winder.

The winder weighs less than 1,500 lb and can be pulled on its skids or operated from a mine car. Main components include a steel frame measuring 7 ft 6 in by 4 ft 8 in by 4 ft 8 in, 5-hp motor, 12½ to 1 speed reducer and 6 to 1 spur gear.

Each spool holds 300 ft of belt and is made of 1-in pipe with a 3-in pipe core. A quick-release floating center is provided on the side opposite the operator.

Pre-cast Slabs Form Roof In Office

A SOLID, STRONG ceiling in the underground mine office at Old Ben No. 9 is provided by pre-cast reinforced concrete slabs. These slabs are mounted between supports made up of two steel rails placed side by side. Rails in turn are supported by the concrete block walls of the office.

KEEP PRODUCTION ROLLING *with help like this . . .*

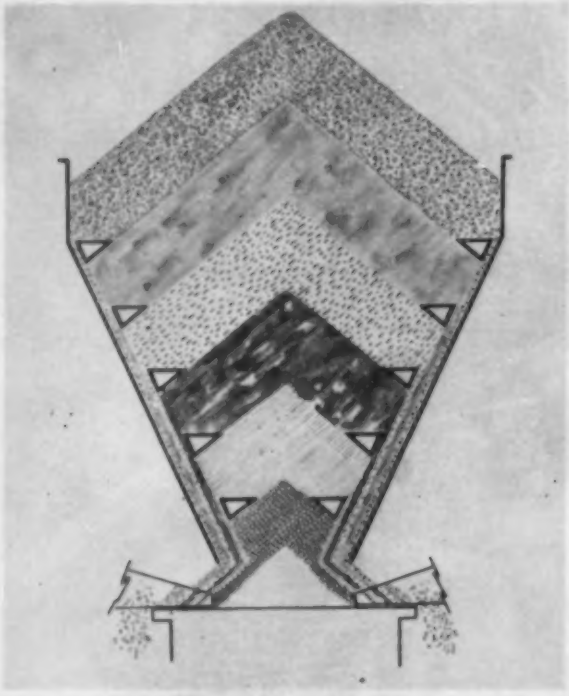
- **EXCLUSIVE "ROLL-AWAY" MOLDBOARD . . . moves tough dirt fast**
- **NEW TOGGLE-TYPE CONTROL . . . kick-free in the rough . . . pinpoint accuracy**
- **HIGHEST AXLE AND THROAT CLEARANCE in its class . . . for better handling of biggest loads**
- **TOUGH TUBULAR FRAME . . . shock-absorbing strength down the middle**
- **BOX-SEAT COMFORT AND VISIBILITY . . . satisfied operators . . . more and better work done on all grading jobs**

ROLL-AWAY is an Allis-Chalmers trademark

These are five of many reasons why Allis-Chalmers FORTY FIVE motor graders are showing up in more and more mining and quarrying operations. They are precisely what the dirt-moving specialists ordered . . . ready now to handle haul road construction and maintenance easily, smoothly. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS *Engineering in Action*

EQUIPMENT NEWS



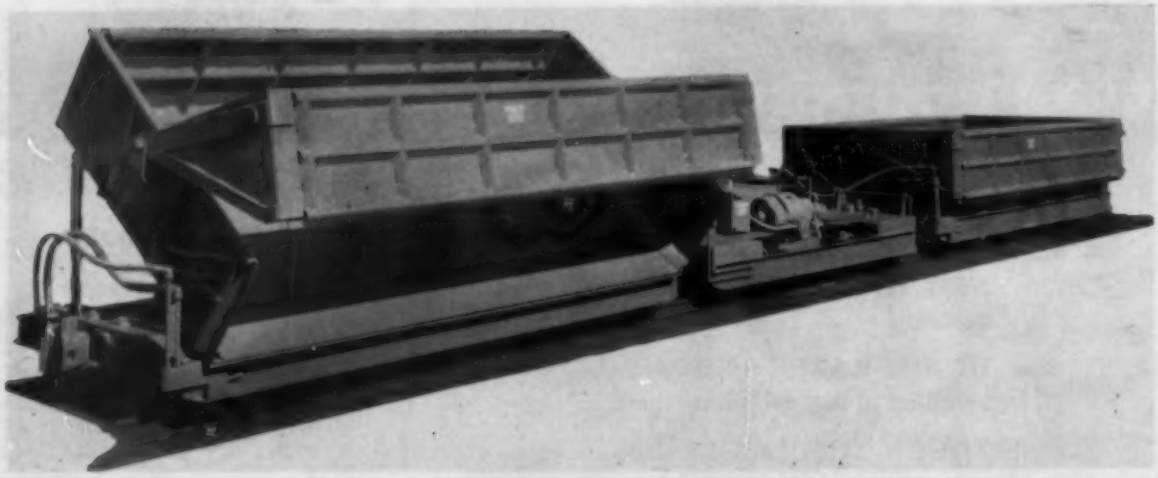
Bin Produces Even Blend

Hewitt-Robins, Inc., Stamford, Conn., disclosed last month a new method of mixing and blending bulk materials to produce a uniformly homogeneous mixture in a continuous flow. The company expects the system to be especially useful in blending coking coal for steel blast furnaces, and in many other free flowing bulk materials processes where the materials may vary physically or chemically in the raw state.

The blending is done in a metal or concrete bin containing a series of overlapping baffles which deflect the outflow to the sides of the container. Material to be blended is layered into the bin by a conventional belt conveyor tripper on top of a rectangular bin, or a simple chute in the case of a cylindrical bin. While the bin is being emptied from the bottom the incoming material is directed into the side chute section in a continuous series of small increments from top to bottom. Blending thus takes place automatically as small portions of each layer enter the chute area and flow downward pulled by gravity. At the bottom of the bin, the material is removed from an outlet shelf by a plow or a similar device, then taken away on a belt conveyor.

The bin can be any size, according to Hewitt-Robins, which says that size depends only on the volume of material for blending. After the bin has been filled, the blending process is carried on constantly by regulating the rate of input to match the rate of drawoff. The result is an even flow of material through the bin at a steady rate, according to the manufacturer.

A patent on the invention has been granted to A. E. Conover, in charge of new product sales for Robins Conveyors Div., Passaic, N.J.



Self-Dumping Mine Car Operates In Train, Dumps Anywhere

A hydraulic self-dumping Granby type mine car has been developed by the Sanford-Day Iron Works, Inc., Knoxville, Tenn. The car, 20 of which were bought recently by a large steel company to haul waste from mines, operates in train, but dumps independently anywhere.

Each car is equipped with a pair of telescoping hydraulic cylinders that raise the car body to a dumping angle of 40 deg. Dumping is controlled with a four-way valve on each car manually actuated by a lever at the side of the underframe. Hydraulic power is supplied from a power unit mounted on a small car and is relayed through hydraulic hoses connecting the cars. The car body, itself, can be raised or lowered in less than 30 sec.

The S-D self-dumping car above has a 10-ton rock capacity. It is approximately 17 ft long, 7 ft wide and less than 4 ft high from the top of a rail. The car was developed for selective dumping during a trip. Each car, of course, can be dumped at the same fixed point.

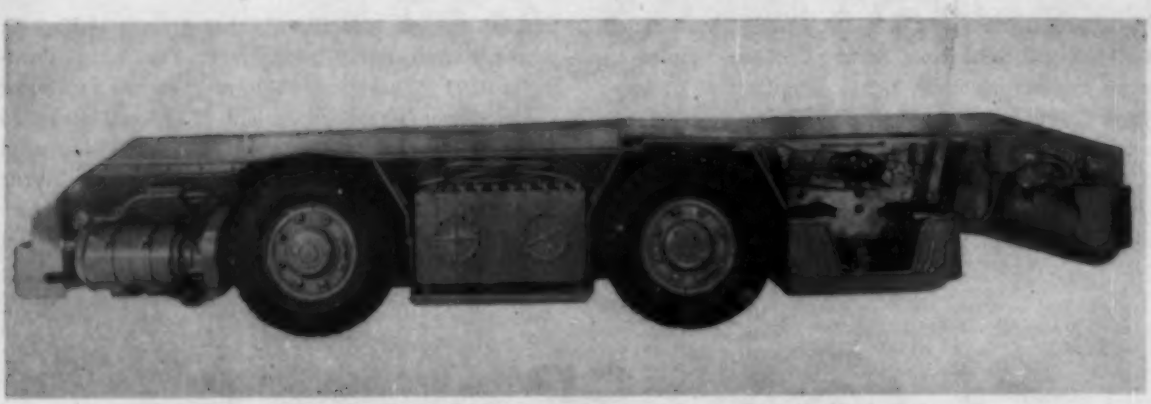
Where hole depth is less than 36", Chicago Pneumatic's RBD-30 Permissible Roof Bolting Unit can complete an entire roof-bolting cycle in 1½ minutes flat! In areas where deeper holes are required, CP completes the job in less than 3 minutes time.

The mobile RBD-30's low height gets it into low ceiling areas usually inaccessible to other machines. And the chuck is telescopic . . . can be adjusted 6" to meet roof irregularities. Built-in slip clutches prevent stalling . . . protect the drill and bolt setting motor. The Chicago Pneumatic RBD-30 is available with these extras: (1) water swivel attachment for wet drilling, (2) special low speed spindle attachment for slow speed drilling, (3) low seam drilling attachment for extremely low coal areas. Write for details. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

CP drills hole and sets bolt

in 90 seconds!

Chicago Pneumatic
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



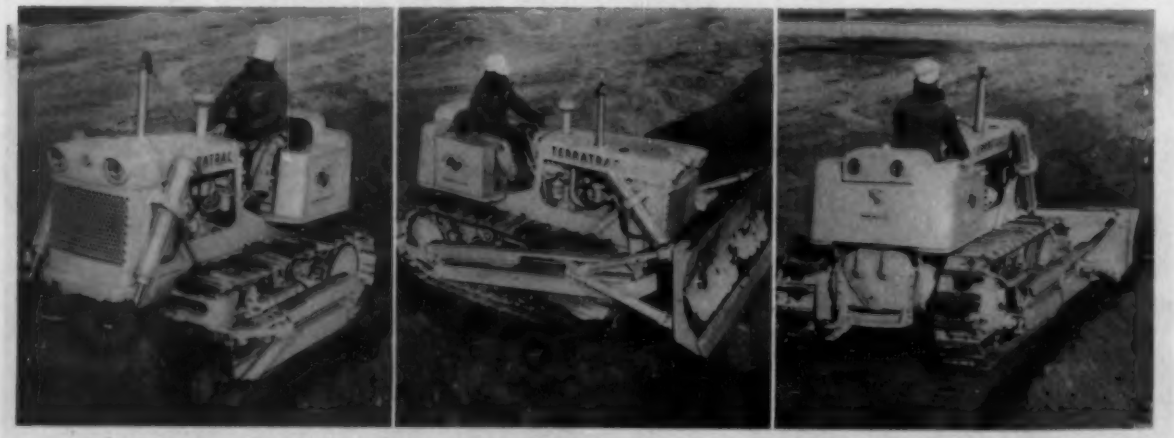
AC Shuttle Car Introduced

Joy Mfg. Co. has introduced a 10-ton-capacity shuttle car that operates on 440-v three-phase 60-cycle AC. Similar in size and general appearance to the company's 10-SC DC model, the new car is equipped with five motors with a total of 90 hp. The outstanding feature of the new car, according to Joy, is the absence of power-reducing transmissions, clutches, mechanical differentials, and clearance-reducing cross shafts. The results, the manufacturer says, are less maintenance and parts stocking as well as better overall performance and longer life.

The elimination of transmissions and mechanical differentials is made possible by using two two-speed traction motors, each rated at 25 hp. These are designed to deliver constant horsepower despite tramming speed. Shifting from one speed to another is accomplished electrically from the operator's platform. Extensive tests by Joy engineers reportedly show that the constant horsepower characteristic is particularly advantageous where extreme grades are encountered. Two two-speed conveyor motors, each rated at 10 hp, feature constant-torque design to accomplish high-speed car unloading without first shifting into low speed. A switch in the operator's section permits slow conveyor speed for belt loading, and conveyor direction can be reversed by reversing electrical connections in the controller section. Joy says that all the car's motors will not heat excessively even after prolonged operation.

Other features of the car include circuit breakers in the controller, disc brakes and built-in electrical braking, forced ventilated controller and a 12-v lighting system.

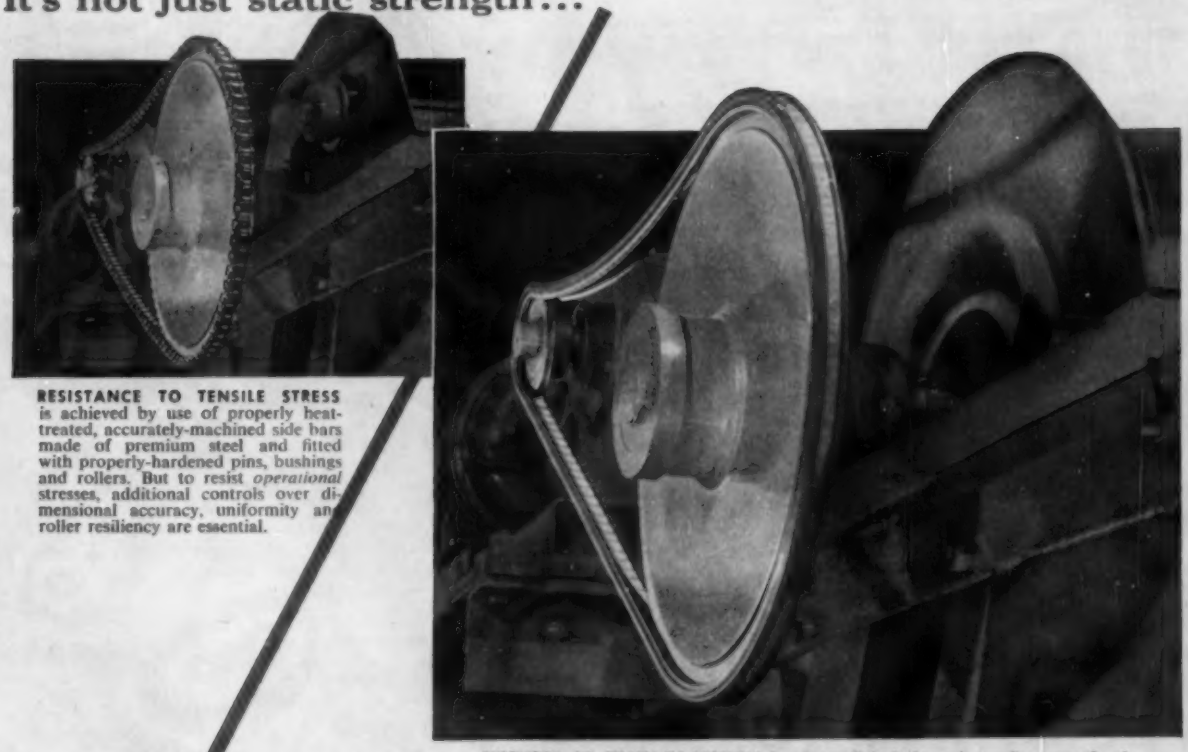
The car is 96 in wide, 24 ft 2½ in long, 49 in or 53 in high. Its speed loaded is 4.4 mph, empty 4.2 mph. It has an inside turn radius of 8 ft 11 in, and an outside turn radius of 20 ft. Capacity is 290 cu ft, 350 cu ft with sideboards. Tires are 12.00/20, 16-ply. The company says the car has been field tested since mid-1956 and is in current production. For more information: Joy Mfg. Co., Dept. HH, Oliver Bldg., Pittsburgh 22, Pa.



Crawler Designed With Independent Track Controls

J. I. Case Co., Racine, Wis., has incorporated into two new heavy-duty Case-Terratrac crawlers, 80 and 100 hp, three "new engineering advancements." The three are referred to by the company as "counter-rotation, torsion-bar suspension, and centralized lubrication." The first, counter-rotation, has to do with Terra-Trac's hydraulic transmission, which provides complete independent power control of each track—both in speed and direction. As a result a tractor operator can turn his machine around in its own tracks by moving two hydraulic valve levers on the steering column. The machine will make a fast 360-deg spin-turn practically within its own length. If space is no problem the operator can make smooth power turns by driving one track faster than the other in the same direction. Or, if he wants to pivot-turn he touches one of two hydraulic

It's not just static strength...



RESISTANCE TO TENSILE STRESS is achieved by use of properly heat-treated, accurately-machined side bars made of premium steel and fitted with properly-hardened pins, bushings and rollers. But to resist *operational* stresses, additional controls over dimensional accuracy, uniformity and roller resiliency are essential.

STRENGTH OF CHAIN IN MOTION is accomplished through tensile strength *plus* special Link-Belt refinements. These include pitch-hole preparation, micro-finish of parts, special processing of sidebars, prelubrication and rigid quality control from initial selection of materials to final protective boxing.

it's *dynamic strength*

in LINK-BELT Roller Chain that fights fatigue

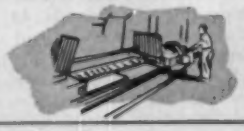
ON high-speed drives or heavy conveying jobs, the components of every pitch of roller chain face severe and repeated operating stresses—engagement with sprockets, shock of starting loads, centrifugal loads and others. That's why *dynamic strength*—ability of chain to resist these stresses—is so important. And it's built into *every length* of Link-Belt Precision Steel Roller Chain.

How is dynamic strength developed? In addition to Link-Belt "extras" . . . special design, manufacturing and processing steps provide required properties of uniformity and accuracy for long-life operation.

Talk over your roller chain needs at your nearby Link-Belt office or authorized stock-carrying distributor. Ask for Book 2457, covering this complete line of single and multiple widths, in ¼ to 3-inch standard pitch, 1 to 3-inch double pitch. 14.272

LINK-BELT gives you dynamic strength that comes from these important EXTRAS

PRE-STRESSING of multiple width chain provides uniform load distribution.



SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.

CLOSER HEAT-TREAT CONTROL —coupled with rigid testing insures uniformity.

LOCK-TYPE BUSHINGS (applied on a range of sizes) end a cause of stiff chain.

LINK-BELT

THE SYMBOL OF QUALITY — LINK-BELT

ROLLER CHAINS & SPROCKETS

LINK-BELT COMPANY: Chicago 9, Birmingham 3, Cleveland 15, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo. Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1, Scarboro (Toronto 13), Springs (South Africa).

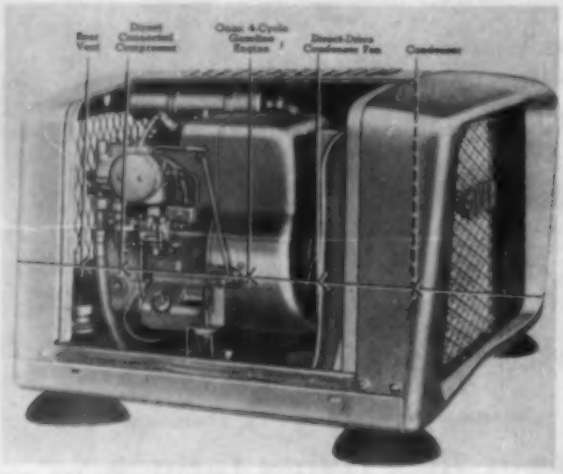
brake pedals, which automatically disengages the clutch and locks the track on the chosen side.

The second of the engineering advances, torsion-bar track suspension, makes it possible for each track to oscillate freely over irregularities in the ground surface. One track, for example, can be run on to an obstacle 12 in high. The other track will remain flat on the ground with the loader bucket, or dozer blade, remaining perfectly level.

The third advance, two-point centralized lubrication, is accomplished with two completely sealed 8-qt capacity reservoirs (one on each side) extending the length of the track frame. Each reservoir has individual feed passages to track wheels. This assures a constant "head" of semifluid grease on each wheel.

Both TerraTracs have four speeds forward up to 6 mph, plus four reverse speeds up to 7 mph. The constant-mesh Terramatic transmission permits an operator to change speeds or direction on the go and without touching the clutch. Both are equipped with Borg-Warner torque converter drives. As a result the 80-hp Model 800 reportedly develops more than 20,000 lb of pull at the drawbar. The 100-hp Model 1000 reportedly will produce 24,000 lb at the drawbar.

Both units are available with a line of matching equipment that includes 1½- and 1¾-cu yd tractor shovels and a hydraulically operated angling dozer blade.

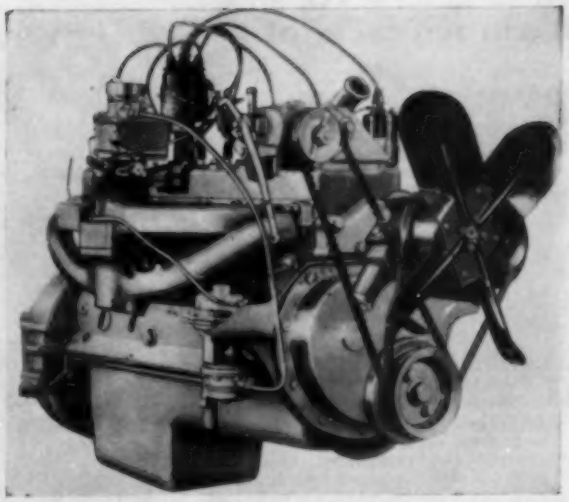


Truck Cab Air Conditioner

A self-contained self-powered mechanical air-conditioning system for truck cabs is being manufactured by D. W. Onan & Sons, Inc., Minneapolis 14, Minn. Named the "Kab Kooler," the unit has been designed specifically for cooling, dehumidifying and circulating air in the driver's compartment of a truck chassis. Onan says, however, that although the conditioner's primary use is for truck cabs, there are dozens of cooling applications. It can be installed in crane cabs, power shovels, earth movers and other equipment where the operator is enclosed. The single-unit design of the "Kab Kooler" makes installation simple, according to the company. Weighing only 225 lb, the unit mounts directly on the roof of a truck cab. Fueled with gasoline or propane, the unit is rated at 1½ tons at 110 deg, 40% relative humidity.

Low Speed, High Torque Engine

A six-cylinder, heavy duty "Jeep" engine for industrial use is being manufactured by the Industrial Engine Dept., Willys Motor, Inc., Toledo, Ohio. The engine is designed to produce high torque at low speeds, says Willys, who declares that extra durability has been provided for every engine component which may be subjected to excessive wear. "This reinforcement of key points," says a Willys spokesman, "results in an engine of unusual ruggedness." The Industrial Engine Dept. points out that during 100-hr tests at 4,000



rpm under full load conditions there were no parts failures or breakdowns "of any kind." The engine operates at a compression ratio of 6.9 to 1 and has a 226-cu in displacement. At 1,200 rpm, maximum continuous torque is 143 ft lb horsepower is 33; at 2,600 rpm, maximum continuous torque is 132 ft lb, continuous horsepower is 65.

Inclined Shaft Mucker

Shaft & Development Machines Co., 808 Newhouse Bldg., Salt Lake City, Utah, has introduced the Cryderman shaft mucker which, the company says, makes other methods of inclined shaft mucking archaic. Equipped with a gimbal-type bracket and a telescoping boom, the mucker, says the manufacturer, is readily adaptable to the job of mucking inclined shafts since it has been proven in vertical shafts. It will operate at angles from 40 deg to vertical. Seven air cylinders, centrally controlled through two levers, provide the machine's power. Through the two levers the cylinders will deliver any desired pressure to swing, lift and extend the Cryderman's boom as it picks up a clam load, retracts and discharges the load into an adjoining muck skip. The manufacturer adds that the unit can be moved up or down a shaft as easily as the adjoining muck skip can be hoisted and lowered.

Tailor-Made Shaft Jumbo

Ingersoll-Rand, 11 Broadway, New York 4, N.Y., has announced the Hydra-Boom shaft jumbo, a new unit said to save setup time, drilling time and manpower. The unit is tailor-made for any shaft size by Ingersoll-Rand engineers who require four basic factors: 1) maximum weight limitations, 2) shaft dimen-

CAT* Motor Graders—now more than ever PROFIT MAKERS FOR YOUR MINE

This Caterpillar No. 12 Motor Grader works two shifts a day, six days a week the year around for the Tecumseh Coal Corp. of Boonville, Ind. Around-the-calendar Caterpillar dependability is traditional in mining work, where these versatile yellow motor graders find wide application in haul road construction and maintenance, snow removal and cleanup.

There are three Caterpillar Motor Grader models: the heavy-duty No. 12 with exclusive oil clutch, the No. 112, and the compact No. 212. Any one of them can reduce wear-and-tear on hauling equipment and step up cycle times with fast, smooth haul roads in *your* mine.

In the long run, Caterpillar Motor Graders cost *less* than other makes. Their economical, four-cycle diesel engines deliver full and foul-free power on inexpensive, non-premium furnace oil. Rugged construction and Caterpillar craftsmanship keep them on the job and out of the shop, and give them high resale value.

All Caterpillar Motor Graders are now available with tubeless tires at no extra cost. Tubeless tires save the cost of tubes and flaps, eliminate 80% of tire down time, and deliver longer casing life and more recaps because they run 10 to 15 degrees cooler.

Caterpillar Motor Graders are built—not merely assembled—by a single manufacturer. Engine power, blade capacity and working speed are carefully matched for maximum efficiency and long work life. All parts and service are available from one dependable source: your Caterpillar Dealer. Ask him to demonstrate the excellent visibility, quick-acting, positive controls and balanced traction that will make a Caterpillar Motor Grader the fast-working favorite of operators in *your* mine.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

99% OF ALL CAT MOTOR GRADERS EVER BUILT ARE STILL IN USE

First step to successful blasting . . .

AUSTIN EXPLOSIVES

Each blasting operation has conditions which make it unique. These may be in the form of hardness of the rock to be shot, excessive moisture, fragmentation desired . . . or the amount of ventilation available if working in underground areas.

Austin produces an explosive to successfully meet every combination of conditions. Among its complete stocks are ammonia grades, ammonia gelatins, permissible dynamites, nitroglycerin and nitroglycerin gelatins.

AUSTIN AKREMITE

A popular item in the Austin line is Akremite. This combination of insensitive ammonium nitrate with carbon is safer . . . simpler to use . . . easier to store. Where applicable, it can cut blasting costs up to 50%.

There is an Austin explosives engineer in your area. He'll be glad to survey your job requirements and make common sense suggestions on how you can cut costs and increase production with Austin explosives.

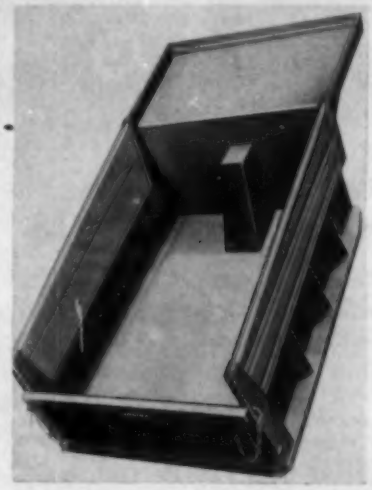
AA-4481

USED IN 1833 AUSTIN & EVER SINCE

AUSTIN
POWDER COMPANY
CLEVELAND 13, OHIO

explosives ◆ permissible dynamites ◆ mine tools
detonating fuse and clips ◆ AP drill heads ◆ Akremite ◆ primers

sions, 3) minimum compartment limitations, 4) size of the headframe opening. Some of the advantages claimed for the Hydra-Boom are better control of hole pattern and direction; better fragmentation; use of larger drills for faster drilling; drilling complete rounds in place of the benching method; and safer operation. Safety, says Ingersoll-Rand, is a built-in factor because of the unit's metal canopy, which offers protection from falling objects. Under operating conditions set up time is cut to approximately 15 min, a result of integrated unit construction, according to Ingersoll-Rand.



Units Increase Payload

A tapered sideboard and load-carrying cab shield combination said to improve load distribution and increase payload capacity within legal limits is being manufactured by the Galion Allsteel Body Co., Galion, Ohio. The sideboards and shield are designed for use on the Galion N and NF series dump bodies and permit over-the-cab loading. With their addition the load center of gravity is shifted forward, placing more weight on a truck's front axle. Galion says the sideboards are available in heights 6 in

LONG HAUL—Even the longest Barber-Greene Conveyors are built of standardized components . . . produced on a precision, quantity production basis. They can be assembled in almost limitless combinations to cut the time and cost of any material handling job.

Long or short haul—it costs less to move materials with belt conveyors

Thousands of installations—ranging from a few feet to thousands of feet—prove that belt conveyors move bulk material at lowest cost.

No other machine is so simple in construction or requires so little maintenance. No other machine can deliver such high hourly capacities with so little power or attention.

Barber-Greene has given a new meaning to belt conveyor economy. Built of standardized components, Barber-Greene Conveyors are delivered sooner . . , require less engineering . . . are erected faster . . . give top performance . . . and are more easily altered to meet changing or expanding requirements. Being standardized, repair parts are readily available—usually from the stock of your local distributor.

SHORT HAUL—Even the shortest Barber-Greene Conveyors are available in standardized components in the width and length to suit your needs. These small conveyors provide the economical way to handle the widest range of materials with greatest flexibility.

56-7-PE

Send for this 192-page conveyor book. It's comprehensive, easy to use.
Write for Catalog 76-A on your company letterhead.

Barber-Greene BG

AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

Equipment News (*Continued*)

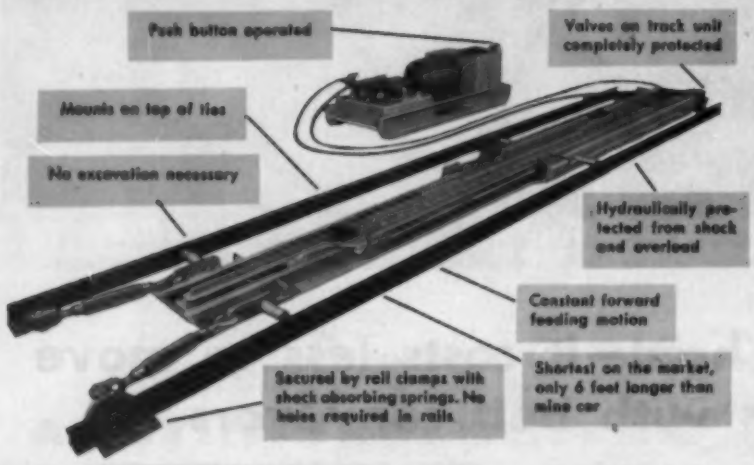
to 18 in. The cab shields are being made in sizes and types to meet individual job requirements.

Diesel Engine Optional

Tractomotive Corp., Deerfield, Ill., has begun making a diesel engine as optional equipment for the company's ½-cu yd TL-6D Tracto-Loader. The diesel, designated the 4DA153, is manufactured by the Buda Div., Allis-Chalmers Mfg. Co. As a vertical overhead valve, four-

cylinder, four-cycle, solid injection full diesel, the unit develops 38 hp at a governed speed of 1,900 rpm. It is equipped with compression ignition for starting and running, and can be bought with priming as standard equipment and electrical preheating as optional. The TL-6D weighs 6,500 lb. It is equipped with power steering, a combination clutch-type transmission and torque converter drive with two speeds, forward and reverse. The bucket is rated at ½ cu yd and can be tipped back 22 deg at ground level.

NOLAN *Porta-Feeder*

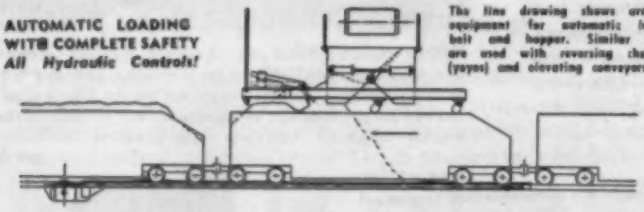

Push button operated
Valves on track unit completely protected
Mounts on top of ties
No excavation necessary
Hydraulically protected from shock and overload
Constant forward feeding motion
Shortest on the market, only 6 feet longer than mine car
Secured by rail clamps with shock absorbing springs. No holes required in rails

The only COMPLETE line of car-spotting and car-loading equipment available

Two NOLAN Porta-Feeder models will help you meet every requirement and condition in spotting cars for loading: 1. Direct Mechanical Drive, 2. Hydraulic Cylinder Type, Hose Coupled to Remote Power Unit (shown above).

There are hundreds of NOLAN Feeders in operation. There are some in your vicinity—ask us to show you how efficient NOLAN equipment can be in your operation.

AUTOMATIC LOADING WITH COMPLETE SAFETY *All Hydraulic Controls!*



The line drawing shows arrangement of equipment for automatic loading from belt and hopper. Similar arrangements are used with reversing chain conveyors (yoyos) and elevating conveyors.

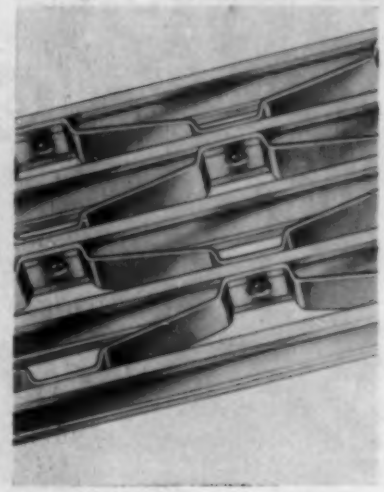
NOLAN

NOLAN SALES AGENTS:

- George C. Hutchinson, Jr., 1304 Keenan Building, Pittsburgh, Pa.
- Huntington Supply & Equipment Co., Huntington Nat'l Bank Bldg., Huntington, W. Va.
- John Lloyd & Sons, 33 Bennett Bldg., Wilkes-Barre, Pa.
- E. C. Morse Machinery Co., 1736 Champa Street, Denver 2, Colorado
- Frank C. Mummott, P.O. Box 154, Castle Gate, Utah
- Amos A. Culp, 429 South 24th Street, Birmingham 5, Alabama
- John North Associates, P.O. Box 105, Harbert, Mich. (Chicago District)

THE NOLAN COMPANY

106 Pennsylvania Street • Bowerston, Ohio



Welded Grating

The Globe Co., 4000 S. Princeton Ave., Chicago 9, Ill., has begun manufacturing "Gold Nugget" welded grating. The grating's primary load bar is a miniature I-beam with all the advantages of a true structural member, according to the company. Globe points out these features: 1) a ⅝-in projection weld nugget for greater rigidity and strength, 2) vertical alignment of the main load bars, 3) all bars are load-carrying bars, 4) an anti-skid pattern. Globe recommends the grating for power houses, loading docks, processing plants and all types of heavy duty platforms.

Metal-Cutting Tool

A pneumatic metal cutting tool capable of cutting up to 55 in per min in 10-gage stainless steel is being manufactured by the Fenway Machine Co., Edgemont & Clementine Sts., Philadel-

Handy Tournatractor services 3 shovels over widely scattered work area in 6000' x 4000' limestone pit. It pushes in shallow toe ahead of shovel for faster loading. It's fast enough to follow the dipper in and out to clean-up truck and dipper spillage.

2 rubber-tired tractors

. . . clean-up around shovels

. . . doze rock between shovel swings

. . . service 10 to 12 crushed-stone stockpiles

. . . make 2-mile swing service cycles

At Material Service Corporation's Thornton, Illinois quarry—the largest commercial quarry in the world—over 3,000,000 tons of limestone are removed yearly. To speed shovel clean-up, dozing, and other jobs at this huge 6000' x 4000' pit, Material Service Corp. uses 2 fast, 17 mph, rubber-tired, 208 hp Tournatractors.

Make 2-mile swing cycle

A major advantage of the rubber-tired Tournatractor on this assignment is its ability to travel fast at speeds to 17 mph, from shovel to shovel . . . scattered .2, .9 and 1 mile apart . . . making a swing cycle for clean-up service of over 2 miles. Instant-shift, constant-mesh transmission enables this big rubber-tired dozer to move in fast and back away in a hurry, without delaying the shovel cycle. Between shovel swings, the versatile tractor dozes in scattered rock to keep material in good shovel-loading position . . . also pushes back toe of blasted material from bank ahead.

Tires eliminate abrasive wear on multiple track parts

Big, low-pressure rubber tires with heavy ground-gripping action make Tournatractor safe and sure-footed. Tires roll *over* abrasive materials . . . do not grind *in* them. They cushion the ride for the operator, and reduce maintenance to a minimum, because 4 wheels do the work of some 500 wearing parts in a crawler-tractor's track mechanism.

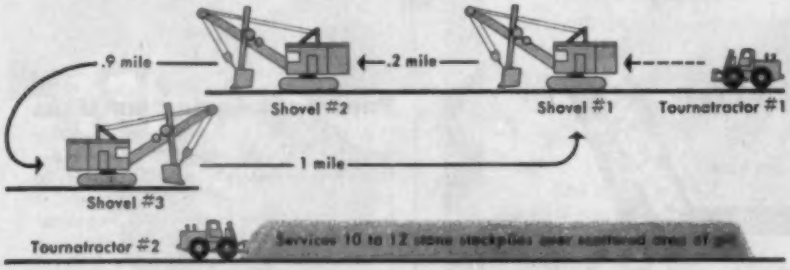
Power from the Tournatractor's 208 hp diesel moves on high-speed, anti-friction bearings sealed in oil. With this all-gear drive you have no chains or tracks to stretch, snag, or wear. Power goes direct from transmission to drive wheels. As a result, there are less friction losses and wear due to hundreds of open parts grinding in dirt or abrasives.

Before you buy a tractor for your clean-up, dozing, servicing, maintenance, or other jobs, investigate the high speeds, lower maintenance, and greater mobility that Tournatractor can give you. It frequently replaces 2 or 3 crawlers in one pit!

Fast 17 mph speeds enable Tournatractor to travel anywhere in the pit, dumps, stockpile area, or plant, with only a few minutes moving delay between assignments. One man, one machine, can make two or three cycles, to cover *all* clean-up assignments per shift. Often, several near-by pits are serviced by one of Material Service's Tournatractors.

Tournatractor maintains and services 10 to 12 crushed stone stockpiles located over a widely scattered area of the quarry. Equipped with 11' 4" wide, 3' 7" high bulldozer blade, Tournatractor dozes bladeful of abrasives.

Tournatractor — Trademark Reg. U.S. Pat. Off. T-940-Q-b

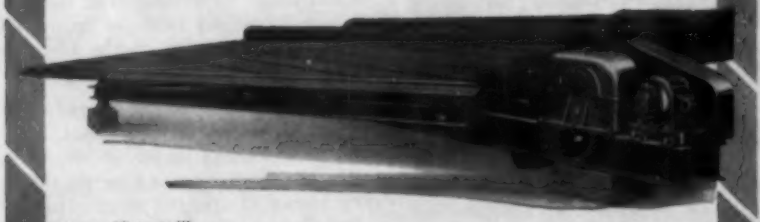


LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

For Economical Preparation of METALLURGICAL-PREMIUM COALS



"Patented"

When removal of free impurities from fine coal sizes must be highly efficient, no other process excels treatment on the SuperDuty® DIAGONAL-DECK® Coal Washing Table.

The extensive use of these tables in the preparation of metallurgical coal is proof of their completely satisfactory performance. Records show thorough and economical removal of the useless impurities. Some preparation plants report efficiencies in excess of 99% while holding product to the necessary low ash specification. Special models available for high refuse feed.

The operation of the SuperDuty table is explained fully in Bulletin 119, which will be sent gladly to engineers and other interested persons. Simply ask for Bulletin 119. Send for your copy today.

CONCENCO®
FEED DISTRIBUTOR

While unexcelled for feeding coal washing tables, the CONCENCO Revolving Feed Distributor effectively provides a splitting of feed into any desired number of equal portions, to accurately feed circuits or machines in battery for their greater overall efficiency. It is a heavily fabricated all steel machine with motor drive requiring 1 H.P. or less in operation.

THE DEISTER ★
CONCENTRATOR
COMPANY
903 Glasgow Ave. • Fort Wayne, Ind., U.S.A.
CONCENCO PRODUCTS

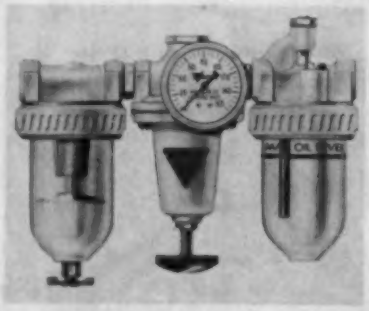
★ *The ORIGINAL Deister Company* ★ *Est. 1906*

Equipment News *(Continued)*

phia 34, Pa. The tool leaves no distortion on either side of a cut. Thus the edge is ready for fabrication. The "nibbler" weighs 13 lbs, measures 13 in in length. Its frame is cast aluminum, and it operates on a heavy duty Cleco air motor. Capacity is 10-gage stainless, nickeled steel and galvanized iron; 8-gage mild steel, aluminum and brass.

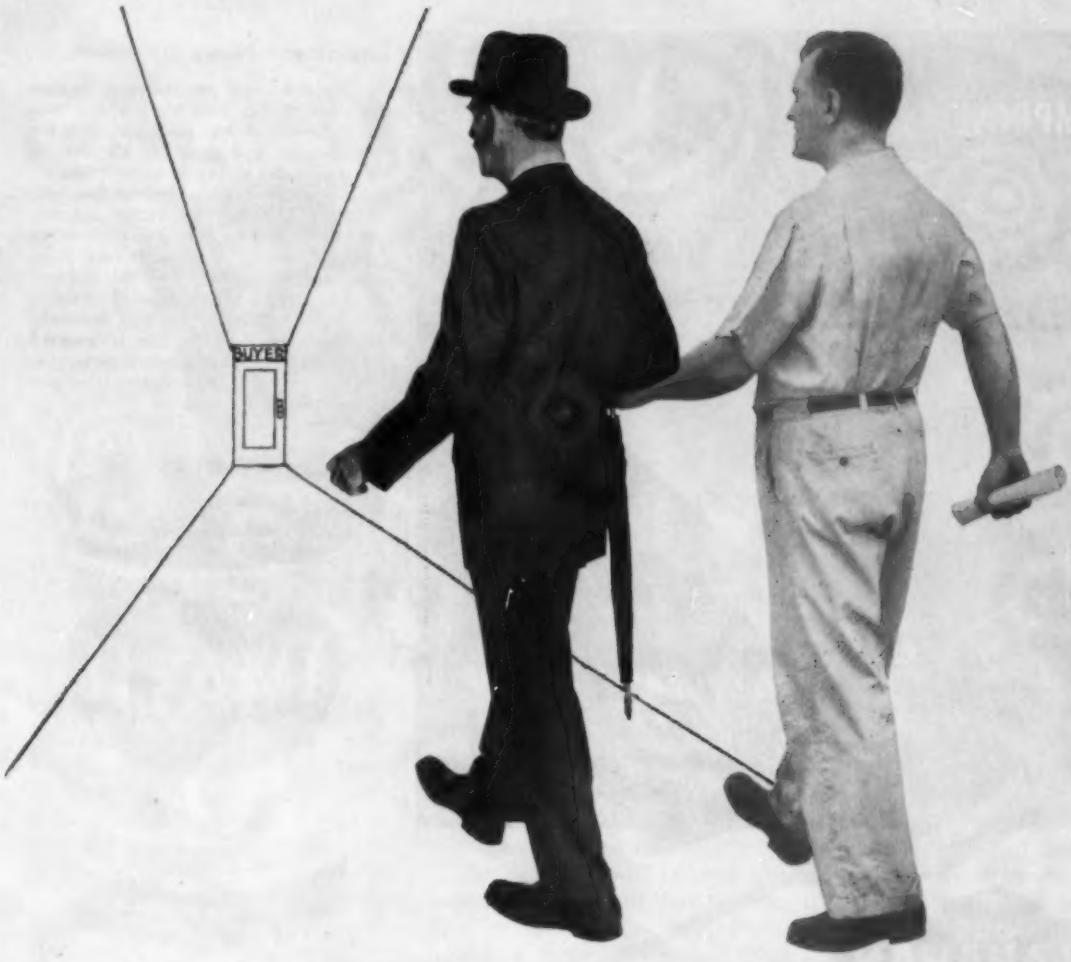
Asbestos, Cement Pipe

Keasbey & Mattison Co., Ambler, Pa., has announced a new, economical asbestos-cement building sewer pipe that will not corrode or rot and may be expected to remain intact under the soil for an indefinite period of time. The pipe is produced in 13-ft sections and 6.5-ft sections, 4-in or 6-in diameters. Connecting sections of pipe can be quickly and so tightly joined by a specially designed coupling that root intrusions are impossible. Since the pipe is very light, one workman can carry a 13-ft section under one arm.



Pneumatic Equipment Units

A line of filter-regulator-lubricator units for the automatic filtration, regulation and lubrication of air supply to pneumatically operated equipment is being manufactured by Watts Regulator Co., Lawrence, Mass. Current sizes are ¼ in, ⅜ in and ½ in. The filter features "tornado action," a contoured air passage which imparts a powerful downward spiral motion to incoming air. The resulting centrifugal action throws for-



Your Wickwire Rope Distributor and our closer operator ...ready to help you

This closer operator—running a machine which forms our rope—is with your Wickwire Rope Distributor every time he makes a call.

True, he's physically in the mill, where he's carefully conducting this final fabricating operation. But, whenever your Wickwire Distributor makes a call, he has the full assurance that every foot of Wickwire Rope has been carefully assembled by skilled craftsmen . . . and that it will give you long, trouble-free service on your job.

It's just one more reason why your Wickwire Distributor knows he's got top-quality wire rope, slings and strand to sell . . . and that these products will serve you well.

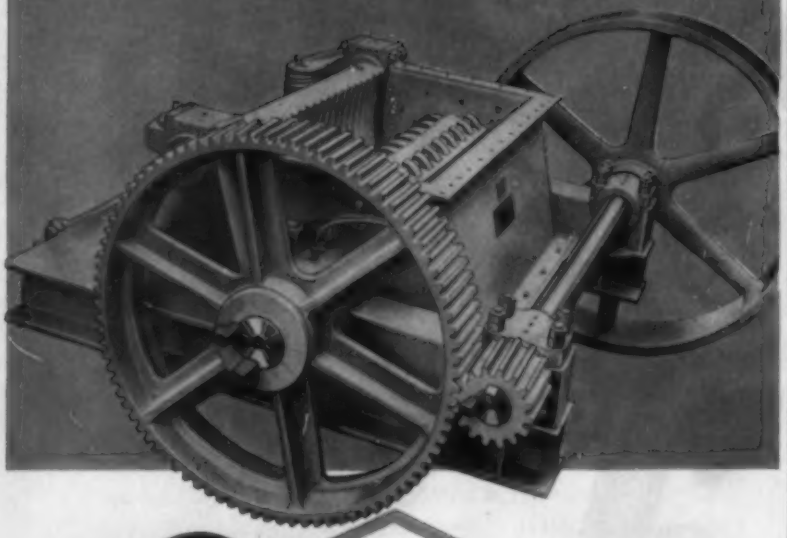
CF&I WICKWIRE ROPE A CF&I PRODUCT

4085

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

IMPROVED DESIGN *for crushing*

COAL... SLATE... WASHERY
REJECTS... MINE REFUSE



McLANAHAN SINCE 1835

Super
BLACK DIAMOND
CRUSHER

- Steelstrut Toggle automatically protects against uncrushable materials
- Quick adjustment for product size
- Cut steel gears

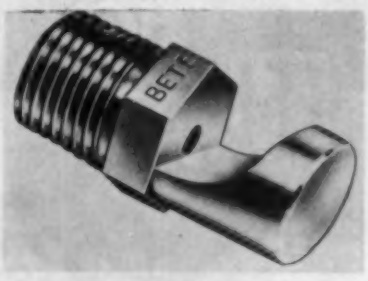
Now available at moderate cost are many of the famous Rockmaster Crusher features. This is a rugged, all-steel crusher—heavier than the conventional Black Diamond, yet not so heavy or costly as the Rockmaster. Super Black Diamond has split bronze bearings, easily-removable crushing plate and steel segment rolls. *Write for Details.*

McLANAHAN & STONE
CORPORATION
PIT, MINE AND QUARRY EQUIPMENT HEADQUARTERS SINCE 1835
250 Wall Street, Hollidaysburg, Pennsylvania

eign particles and condensation against the sides of the filter bowl where they spiral downward into the quiet zone for accumulation and drain-off. Cleaned of larger particles and condensation, the air passes through a porous bronze filter element for final filtering before entering the regulator. The regulator features an aspirator which provides instant compensation or regulation of the reduced pressure under conditions of sudden, heavy and widely varying flow demands. The third unit, the lubricator, is designed with a high-velocity venturi section to assure practically 100% vaporization and assimilation of metered oil.

Diesel Engine Oil

The Amalie Div., L. Sonneborn Sons, Inc., has announced Amalie X-L-O diesel engine oil. The oil was developed, says the company, to meet the difficult and critical lubrication demands of present-day diesels. The company says that X-L-O is formulated from an Amalie-created diesel oil compound named Protol. It is designed to 1) reduce formation of carbon, gum and sludge, 2) disperse and suspend carbon and sludge deposits that do form, 3) minimize varnish formation on cylinder walls and piston skirts, 4) form a tough oil film, and 5) inhibit bearing corrosion.



Flooding Nozzle

Bete Fog Nozzle, Inc., Greenfield, Mass., has begun making a new line of

How an extra 1/2 inch of metal is saving crawler owners thousands of dollars

Why did so many crawler treads fracture after only a few years service?

Kensington Engineers set out to find the answer. They talked to operators . . . they investigated working conditions . . . and they studied hundreds of broken treads to find what was making them fail.

Then they put their research to work. They heavied-up supporting ribs, reinforced other highly-stressed points by as much as ½ inch, and developed ORO SUPERMANG, a remarkable alloyed manganese steel.

SUPERMANG defies abrasion by developing unusual surface hardness under impact and wear. At the same time, the softer metal underneath this ever-hardening "skin" is able to withstand impact and shock because it remains tough.

The resulting treads may not look a great deal different than the ones you are now using . . . but when it comes to *performance*, just listen to this:

Sand, gravel, and crushed stone producers report these improved treads outlast others by as much as 4 to 1. In the coal fields, you'll find Kensington-engineered treads still going strong after more than 14 years of steady use. And up in the rugged Lake Superior mining country they have been a favorite for over 23 years.

You can buy Kensington treads to fit any standard make of shovel. Take-up tumblers, crawler sprockets, crawler rollers, and dipper-tooth points are also available in durable, wear-resisting SUPERMANG. Despite their superior performance, they cost no more than ordinary parts.

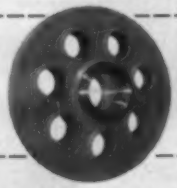
Figure what *you've* been spending for labor and replacement parts. Then use this handy coupon to find how much *you* can save by switching to SUPERMANG.

You'll be under no obligation.

Wear-Resisting, Money-Saving, Shovel Parts

Long-wearing treads to fit all standard sizes and makes of power shovels.

Crawler rollers made of wear-defying Kenseloy.



Dipper teeth of various sizes and designs that stand up under most severe digging conditions.

Kensington STEEL COMPANY

KENSINGTON STEEL CO., Dept. C, 505 E. Kensington Ave., Chicago 28, Ill.

SUBSIDIARY OF POOR & COMPANY • CHICAGO

☐ Quote Prices ☐ Have Representative Call ☐ Send Literature

Description of Part_____

Make of shovel or dragline_____ Model_____

Casting No._____ No. per set_____ Over-all width_____

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

Equipment News (*Continued*)

flooding nozzles with a wide angle flat spry pattern—145 deg at 40 psi. As a result of the angle pattern spray impact is low. Nine models are available with ⅛-in, ¼-in, ⅜-in, ½-in and ¾-in male pipe thread connections. Orifice sizes vary from 3/32-in diameter to ½-in diameter with flow rates from ⅛ gpm to 75 gpm. Although standard material is brass, the new nozzles, designated "FF," are available in various types of stainless steel, aluminum, nylon, teflon, hard rubber and other machineable plastics and alloys.

Face Mask Respirator

A new respirator introduced by Willson Products Div., Ray-O-Vac Co., Reading, Pa., has been approved by the U. S. Bureau of Mines as a protector against dusts, pneumoconiosis producing mists and chromic acid mist. Designated the No. 600 MonoMask, the unit is of one-piece, molded rubber construction. It uses a single filter of treated felt which, the company claims, offers higher filtering efficiency and longer life than any approved filter on the market. The filter is held in position by a nylon retainer. No clips or fasteners are needed. The MonoMask's design provides a better fit when the mask is worn with spectacles or goggles. The pleated construction on top of the facepiece is designed to assure a close fit around the bridge of the nose.

For Vertical Pump Units

A complete line of totally-protected, vertical solid shaft P-base motors for all vertical pump installations has been announced by Reliance Electric & Engineering Co., Cleveland, Ohio. The new motors, with normal thrust bearings in all sizes from 1 to 40 hp—high thrust sizes from 1 to 15 hp—are available in protected, totally-enclosed, or explosion-proof enclosures. Designed for indoor and outdoor installations, all the motors are corrosion-proof. Shafts are sealed with neoprene.

Hoist Dumps In 6 Sec

Hercules Steel Products Co., Galion, Ohio, says it is producing a new single, front-mounted telescopic hoist capable of raising and dumping in less than 6 sec. Designated the Model 1215, the new hoist is a 3-in telescopic type that is designed for high-speed batching opera-

CLARKSON Redbird

HEVI-DUTI UNIFLIGHT CONVEYOR CHAIN

FOR MOST LOADING MACHINES AND CONTINUOUS MINERS

Top grade chain to secure maximum life
Heat treated — drop forged universals
Straps pressed on with extra tight fit
Heat treated alloy pins pressed and welded
Heat treated alloy pin — pressed and riveted
Heavy drop forgings with triangular section — Inclined faces and concave bottom insure pan cleaning—May be run in either direction

CLARKSON MFG. CO. NASHVILLE, ILLINOIS

Free-riding, all-rubber fillers for moisture resistance, splicing and terminating ease unusual flexibility
Special, helically-wound semi-conducting tape around each extra-flexible, stranded conductor, to prevent ionization
Butyl conductor insulation, for outstanding electrical properties, plus heat, moisture and ozone resistance
A combination of properties which permits operation with copper temperatures up to 85°C

IT'S THE EXTRAS THAT MAKE THE DIFFERENCE IN ROEBLING SH-D PORTABLE POWER CABLE!

These *extra* features and others—such as the tough, abrasion- and weather-resistant Roeprene® Sheath—mean rugged, *full-power* Roebling SH-D Portable Power Cable really can stand the gaff.

If you saw this cable made, you'd know why it is so tough... and if you saw it made, you'd never specify anything else! For complete information, write Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING

Distributors, Branches and Warehouses in Principal Cities

Subsidiary of The Colorado Fuel and Iron Corporation

WILD
HEERBRUGG

T-16 Optical Transit

A brand new WILD *instrument that's breaking records for speed, accuracy, easy set-up and operation!*

The T-16 embodies many brilliant new concepts. They add up to a degree of optical and mechanical precision, as well as versatility, that you'll find *impossible to duplicate with any other instrument at this price.*

NOTABLE FEATURES OF THE WILD T-16

- Direct scale reading to 1 minute; interpolation to 20 seconds.
- Azimuth and vertical scales seen simultaneously and read directly.
- Built-in repeating clamp for setting on zero. Eliminates lower plate motions.
- New optical plumb with upright image to speed setting up.
- Optional accessories include battery box providing illumination for scales, level vials and telescope reticle.
- Excellent for mining, highway and land surveying.

PRICE: $700 F.O.B. Port Washington, N. Y. Tripods extra. Write for Booklet T-16

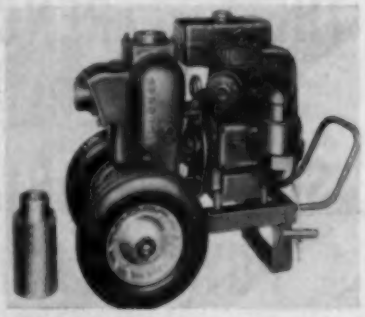
WILD HEERBRUGG INSTRUMENTS, Inc.
Main at Covert Streets • Port Washington, N. Y.
POrt Washington 7-4843
SALES • FULL FACTORY SERVICES

Equipment News (*Continued*)

tions or wherever fast dumping is essential. A special bleeder valve provides hydraulic cushioning at the end of a lifting stroke to prevent cylinder damage. Accelerating the truck engine at the top of a stroke provides a rapid 4- to 10-in rising and falling motion of the body. This assures fast, clean dumping, says Hercules. A heavy-duty, high output pump provides the large volume of oil necessary for high-speed hoist action. Cooler operating temperatures are achieved with the 22-gal capacity of the hoist system.

Flexible Coupling

Charles E. Manning Co., 4700 Clairton Bldg., Pittsburgh 36, Pa., is manufacturing a flexible coupling for grooved end pipe. Stocked in sizes from 1 in to 8 in with other sizes on request, the Alumiron coupling is made with either iron or aluminum and is furnished with Buna N or neoprene gaskets. For high temperature applications, a special silicone compound is supplied. The Alumiron can be quickly coupled or uncoupled by loosening or tightening two bolts which pass through its halves. A tight seal is made by drawing up the two half housings with a socket wrench. The seal increases as the vacuum or pressure increases up to 1,000 lb.



Portable Engine Pumps

A series of portable, self-priming, gasoline engine-driven, contractor pumps has been introduced by the Aurora Pump Div., New York Air Brake Co., Aurora, Ill. Designated Series M, the new models (five in all) are designed for general purpose drainage, irrigation and fire-fighting applications. Quickly primed, self-cleaning and designed with a high

The Wilfley Story ...
is written in the production records of industrial plants throughout the world. It is a story that proves these simple but vital facts:

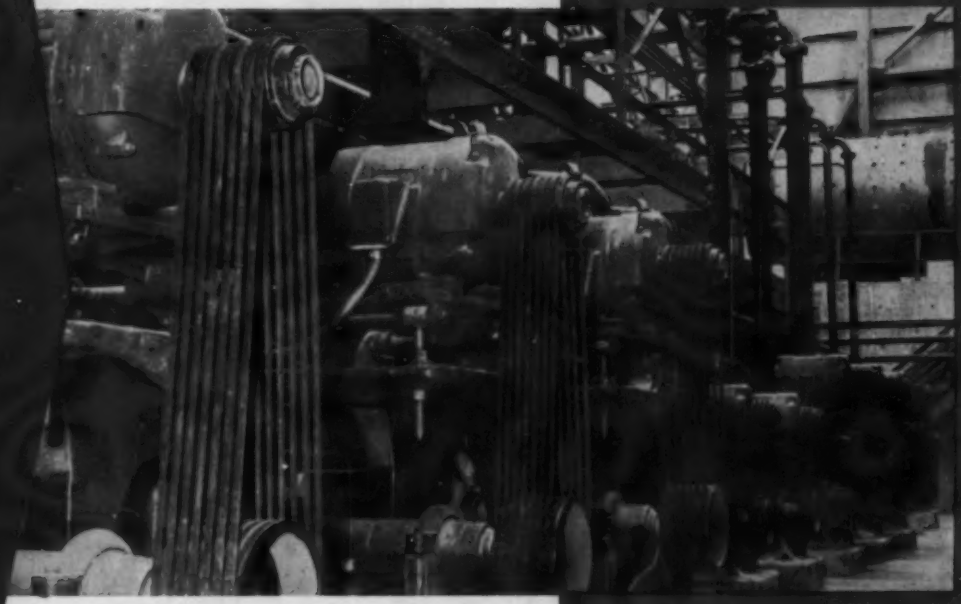
WILFLEY SAND PUMPS
Provide LOWER PUMPING COSTS

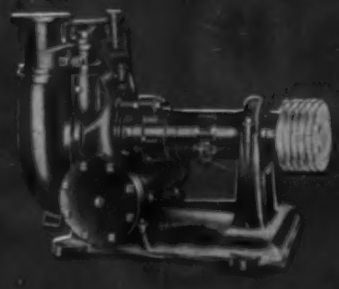
thru ***higher efficiency***

thru ***longer pump life***

thru ***lower maintenance costs***

thru ***24 hour, trouble-free operation***





Wilfley Sand Pumps are available with interchangeable metal or rubber parts to meet the requirements of every installation.

Write, wire or phone for complete details.
Individual Engineering on Every Application

A. R. WILFLEY AND SONS, INC.

DENVER, COLORADO, U. S. A.
N. Y. OFFICE: 122 EAST 42ND ST., NEW YORK CITY 17

head output, the pumps' maximum capacity, from the smallest to the largest is 105 gpm and 351 gpm. Inlet and outlet connections range from 1½ in to 3 in. Pump and engine are mounted on a common base, and are portable. Two of the models, the 5M and the 8M pumps, can be equipped with carrying handles or spring-mounted pull skids. The remaining three, Models 10M, 15M and 20M, can be made with carrying frames, steel wheel and rubber tire carriages. Because of the portability of the pumps, New York Air Brake recommends them as "ideal" for operations remote from power.

Free Bulletins

CAST ALLOY STEEL—"Wearpact," a cast alloy steel said to contain an unusually high resistance to impact and abrasion, is described in a 4-p leaflet by the manufacturer, American Steel Foundries, Prudential Plaza, Chicago 1, Ill. High tensile strength, high yield point, high impact resistance—all reportedly qualities of the product—are both charted and text-described in the leaflet.

WIRE ROPE—The current issue of the Macwhyte Co.'s trade bulletin, "Rope-ology," carries the announcement that "PREmium" Whyte Strand is the name adopted for the company's "extra improved plow steel" wire rope. The bulletin, No. 5685, is available from the Macwhyte Public Relations Dept., Kenosha, Wis.

EMERGENCY LIGHTING — Exide's "Lightguard," the emergency lighting unit with a fully automatic recharge, is explained in detail by Exide Industrial Div., The Electric Storage Battery Co., Philadelphia, Pa., in a leaflet designated Section 61.04.

MINE LOCOMOTIVE BATTERIES — C&D Batteries, Inc., Conshohocken, Pa., has released Bulletin ML-567, '56 covering its line of Slyver-Clad mine locomotive batteries, batteries for trammers, shuttle cars and tunnel haulage equipment. Data includes battery ratings and capacities, design, construction, dimensions and weights.

GRINDING, MIXING—The U. S. Stoneware Co., Akron 9, Ohio, is distributing Bulletin 280 on "Grinding and Mixing Equipment" manufactured by the company. A special chapter deals with the principles of jar, ball and pebble milling. Listed are jar mills, grinding media, drum rollers and tumblers.

FLUID SYSTEM SPECIALTIES—Catalog 4395 shows the Parker fluid system specialties: clips for support of tube lines, a dual heat transfer coil for cooling applications, a pressure snubber for protection of gages, and a manifold valve to simplify draft gage line blow out. Tube & Hose Fittings Div., Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio.

COATINGS MANUAL—The new Rust-Oleum 1957 coatings manual, containing information to enable the user to determine specific coatings for specific purposes is being distributed by the Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill. Named "Stop Rust with Rust-Oleum," the booklet contains pages of color charts with adjoining text explaining the use of each general type coating, i.e. farm, oil field, machinery, etc.

COAL DUST CONTROL—Wheelabrator Corp., 1050 S. Byrkit St., Mishawaka, Ind., is distributing Bulletin 551-D on the control of dust from coal and coke handling operations. Described is the use of local exhaust ventilation and cloth-tube-type dust collectors. Four cases histories are presented.

ENGINEERING SERVICE—Kaiser Engineers Div., Henry J. Kaiser Co., Kaiser Bldg., Oakland 12, Cal., is distributing a booklet describing its services. Named "this is Kaiser Engineers," the company covers every type of service it offers, from project location to project organization.

MAGNETIC SHIELDING—Data sheet 101 (1957) describes construction fea-

Our sale of replacement parts averages ONLY $50.00 per machine year!

Which means the average cost of repairs to STAMLER CAR SPOTTERS is 1/100 of 1¢ per ton mined!

WE'D go broke if we had to depend on replacement parts business. *Because the amount of replacement parts we sell for Stamler equipment is so small that it sounds incredible!* Think of it — the average is only $50.00 per machine year! This means that the average STAMLER Car Spotter is operating at a repair parts cost of only 1/100 of 1¢ per ton and the oldest machine went into service in 1949! (And we know that many of the parts purchased are still on the shelf and have never been needed!) *That's what we've been telling you:*—that you can mine faster, more efficiently and more economically with STAMLERS; that STAMLER'S hydraulic construction gives you trouble-free service with negligible repair cost! *When are you going to give your mines the benefit of STAMLER superiority?*

STAMLER *Hydraulic* CAR SPOTTERS

SCHROEDER BROS., Exclusive Eastern Sales Agent Pittsburgh, Pennsylvania
UNION INDUSTRIAL CORP., Carlsbad, New Mexico

W. R. STAMLER CORPORATION
PARIS, KENTUCKY

SALMON & CO., Birmingham, Alabama
WESTERN SALES ENGINEERING CO., Salt Lake City, Utah

REMOVE MORE MOISTURE FROM YOUR COAL

WITH

SYMONS® V SCREENS

here are 3 reasons why:

1. Force of over 5 times gravity:

Symons V-Screens get appreciably more moisture from fine coal than is possible with conventional screens which depend on *gravity alone* to do the job. V-Screens fully utilize the extra force of centrifugal action . . . a force of more than five times gravity.

2. Full 12 feet of screening surface:

In contrast to conventional dewatering screens, Symons V-Screens uniformly disperse the coal and water to a full 12 feet of screening surface . . . double that of the widest conventional dewatering screen now in use.

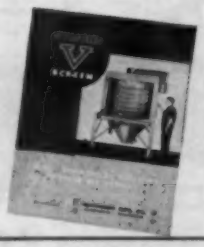
3. Easily controlled speed:

Operating speed of Symons V-Screens is easily controlled, enabling operators to vary screening force, bed thickness, length of material retention and capacity to meet varying plant or mine conditions.

It is important to remember that with the more efficient and thorough dewatering obtained with Symons V-Screens you save on thermal drying cost.

● The Symons V-Screen will dewater coal from 1½" down and is ideally suited for dewatering in the ¼" x 0 size range. Experience from actual operations indicates the Symons V-Screen will generally handle from 2 to 2½ times the capacity per square foot of screening surface of conventional type screen.

In addition to dewatering, Symons V-Screens are ideally suited for sizing, de-dusting, de-silting and washing operations.



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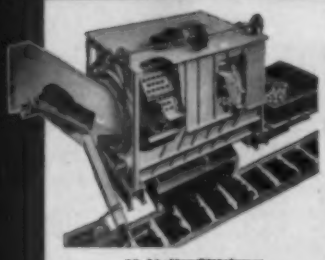
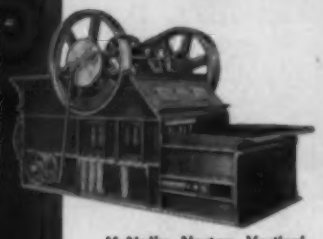


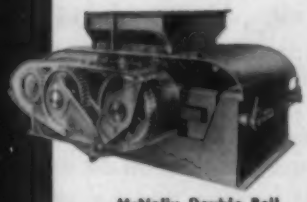
McNally Pittsburg Rotary Breaker

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



McNally Norton Vertical Pick Breaker

50% Less fines when reducing lump to egg and stove sizes.



McNally Double Roll Gearmatic ROM Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.

McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.

McNally Single Roll Crusher

Universal application 20", 24" and 36" diameter rolls.

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Equipment News *(Continued)*

tures, performance characteristics and typical applications of non-shock sensitive non-retentive Fernetic and Co-Netic magnetic shielding material. The data sheet is distributed by the Magnetic Shield Div., Perfection Mica Co., 20 N. Wacker Drive, Chicago 6, Ill.

DRILLING SUPPLIES – Catalog 756, published by Brunner & Lay, Inc., 9300 King St., Franklin Park, Ill., carries 20-p of illustrations and text on carbide rock bits, drill steels, pneumatic tool accessories—e.g. moil points, sabur points. Pictures and specs are given for each product.

SPRAG CLUTCHES – Information on sprag clutches for overrunning, indexing, and backstopping applications is contained in Catalog 104-C, published by the Formsprag Co., 23601 Hoover Rd., Van Dyke, Mich. Current uses of the clutches include automobile transmissions, conveyor belts and punch presses.

TEMPERATURE CONVERSION CHART—Moeller Instrument Co .is distributing a temperature conversion chart that gives equivalents of Fahrenheit and Centigrade readings at a glance. Conversion of either is reached as quickly as you can read. Richmond Hill 18, N.Y.

TEMPERATURE REGULATORS—Construction and functions of the 650 Series of temperature regulators made by Atlas Valve Co., 280 South St., Newark 5, N.J., appears in Bulletin TR-57 published by Atlas. The regulators are a balanced type construction and are vapor pressure operated, single seat or double seat designs.

SILICONES – Nearly 150 commercially available silicone products are described in the new Dow Corning catalog. Products are grouped by usage (e.g. water-repellents, dielectrics, release agents, etc.) to permit engineers to locate a material by what it does as well as by what it is. Dow Corning Corp., Midland, Mich.

FLARELESS TUBE FITTINGS—Weatherhead Co., from its Customer Service Dept., 128 W. Washington Blvd., Fort Wayne, Ind., is distributing a 48-p catalog on the 7000 Series and the 8000 Series hydraulic flareless tube fittings. Complete engineering data is included.

SPECIAL LUBRICANTS—Bulletin BU-58 deals with special lubricants for earthmoving, mining, road building, and is distributed by Keystone Lubricating Co., 3100 N. 21st St., Philadelphia 30, Pa. Working ranges, melting points, penetrations, moisture repellence are given in a pair of charts accompanying the bulletin.

EQUIPMENT MANUAL—Office equipment, industrial ovens, modern flow lockers, safety ladders—all are part of the general array of equipment displayed in a manual by the Precision Equipment Co., 3706A Milwaukee Ave., Chicago 41, Ill.

STEEL DATA—A revised edition of a 256-p pocket size steel-data book is being distributed by Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill. Information on machining and fabricating is included with specifications and tolerances, weights and dimensions of Ryerson steels.

VALVES—The complete line of R-P&C forged steel gate and needle valves is illustrated and described in Bulletin DH-80 by the R-P&C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.

ABRASIVE CUTTERS – The complete line of Campbell abrasive cutting machines appears in a 4-p folder, Bulletin DH-460-B, published by the Campbell Machine Div., American Chain & Cable Co., Inc., Bridgeport 2, Conn. Twelve models of varying capacities are illustrated. Specifications are included and data for Allison abrasive cutting wheels are also listed.

PUMPS—Dorr-Oliver, Barry Place, Stamford, Conn., is distributing "Application Engineered," (Bulletin 5000) in which the complete line of Dorr-Oliver pumps is the subject. Included are centrifugal pumps, slurry pumps, Olivite acid handling pumps and the Dorrco type V and plunger pumps.

WELDER—The "Amsco" semi-automatic welder for hardfacing is the subject of Bulletin 6-56, published by the American Manganese Steel Div., Dept. A, Chicago Heights, Ill. The "MF" welder and its component parts are explained in detail; one section is devoted to semi-automatic manganese steel build-up, another covers hardfacing.

In Kentucky ...and the World Over

Bucyrus-Erie's Special Machines for Special Jobs Keep Operating Costs Low

At a large mining operation near Central City, Ky., two Bucyrus-Erie 190-Bs, specially built for the work they perform, are bringing new economies to open-pit coal removal.

Coal at this location occurs in two seams separated by a 4-ft. layer of clay and limestone, which must be drilled and blasted. This layer is being removed by a 190-B stripping shovel with 70-ft. boom and 6-cu. yd. dipper. Loading out coal from one of the seams has been assigned to a special 190-B coal loader equipped with 10-cu. yd. dipper.

Like other Bucyrus-Erie Ward Leonard electric shovels, these machines have the advanced-design features that mean high-output, low-cost performance month after month. Their modern front end design and heavy duty construction offer great strength while reducing power-wasting deadweight. Ward Leonard control permits rapid acceleration and deceleration for high-speed, coordinated operation.

Let us give you the facts on the 190-B and two other models—the 4½-yd. 110-B and the 6-yd. 150-B. Write direct for full information.

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SOUTH MILWAUKEE, WISCONSIN

COAL AGE

NEWS ROUND-UP

Eisenhower Proposes $71.8 Billion Budget; Humphrey Decries High Spending Rate

Defense, foreign aid and atomic energy expenditures up.
Release of gas producers from price control proposed.
Membership in proposed Organization for Trade Co-operation urged.
Private industry requested to speed up atomic power under threat of government development.

A BUDGET OF $71.8 BILLION for the fiscal year beginning July 1, 1957, was proposed to Congress Jan. 16 by President Eisenhower. This is an increase of $2.9 billion over expenditures in the present year, largely as a result of increased outlays for defense, foreign aid and atomic energy. Receipts for the new fiscal year are estimated at $73.6 billion, up $3 billion on the expectation that business activity will expand.

President Eisenhower emphasized that inflationary pressure was still a problem and noted that he had asked federal agencies to "postpone work which can be appropriately put off." He also asked industry and labor to hold down wage and price increases.

Presentation of the budget found George M. Humphrey, Secretary of the Treasury dissatisfied with the rising trend in federal expenditures. Noting that he was opposed to several government programs, Mr. Humphrey expressed the hope that Congress could see its way clear to making cuts while still leaving enough for a "proper" job in the security and public-service fields. He also stated that if the "terrific" tax burden is not reduced in the future "you will have a depression that will curl your hair, because we are just taking too much money out of this economy that we need to make the jobs that you have to have as time goes on."

Among the President's recommendations immediately affecting coal or having the possibility of a future effect were the following:

Resources Development—"The program of the administration in the field of natural resources is fully set forth in that section of the budget analysis. It will not be repeated here, except to indicate my continuing firm support of the necessary legislative action to enable federal agencies to participate more fully with states, local governments and private groups in the development of partnership resources projects. I urge once again prompt enactment of legislation which will enable the Frying Pan-Arkansas multiple-purpose project to get under way in the fiscal year 1958.

"I also recommend prompt action by the Congress to decide how the Niagara power project can be best developed."

Natural Gas—"In returning the Harris-Fulbright Natural Gas Bill to the 84th Congress without my approval, I stated that legislation conforming to the basic objectives of that bill was needed. I am still of that opinion. It is essential that the consumers of natural gas be protected. We must endeavor to make sure that there will be continued exploration and development of adequate field supplies of gas and that producers' sales prices are arrived at fairly and competitively. In this way, and with the authority vested in the Federal Power Commission to regulate interstate pipelines as to the price at which gas may be charged as an item of cost in fixing their rates, the cost to the public will be fair.

"Legislation freeing gas producers from public utility-type regulation is essential if the incentives to find and develop new supplies of gas are to be preserved and sales of gas to interstate markets are not to be discouraged to the detriment of both consumers and producers, as well as the national interest."

Foreign Trade—"As has already been indicated in the State of the Union message, continuation of military and economic assistance to the free nations of the world is a keystone of the administration's efforts to promote peace, collective security and well-being for all peoples. Essential complements of these assistance programs are steps to increase international trade and investment. Both can be materially advanced by taking the actions necessary to avoid unfair tax duplications on business conducted overseas and by the prompt enactment of legislation approving United States membership in the proposed Organization for Trade Cooperation. This administrative agency will greatly aid the orderly operation of existing arrangements governing multilateral trade to help prevent discrimination and restrictions against our foreign commerce."

Atomic Energy—"Efforts to develop the peaceful uses of atomic energy will be greatly increased, particularly the development of reactors to produce atomic power at competitive prices. . . . In the belief that the basic responsibility for construction of large-scale commercial power reactors should not have to be assumed by the federal government, no funds for construction of new large-scale reactors are proposed in this budget. A number of new proposals from nonfederal interests are now being developed. However, if acceptable proposals for non-federal construction of promising reactor types do not materialize within a reasonable time, a request will be made to Congress for funds for direct construction by the federal government."

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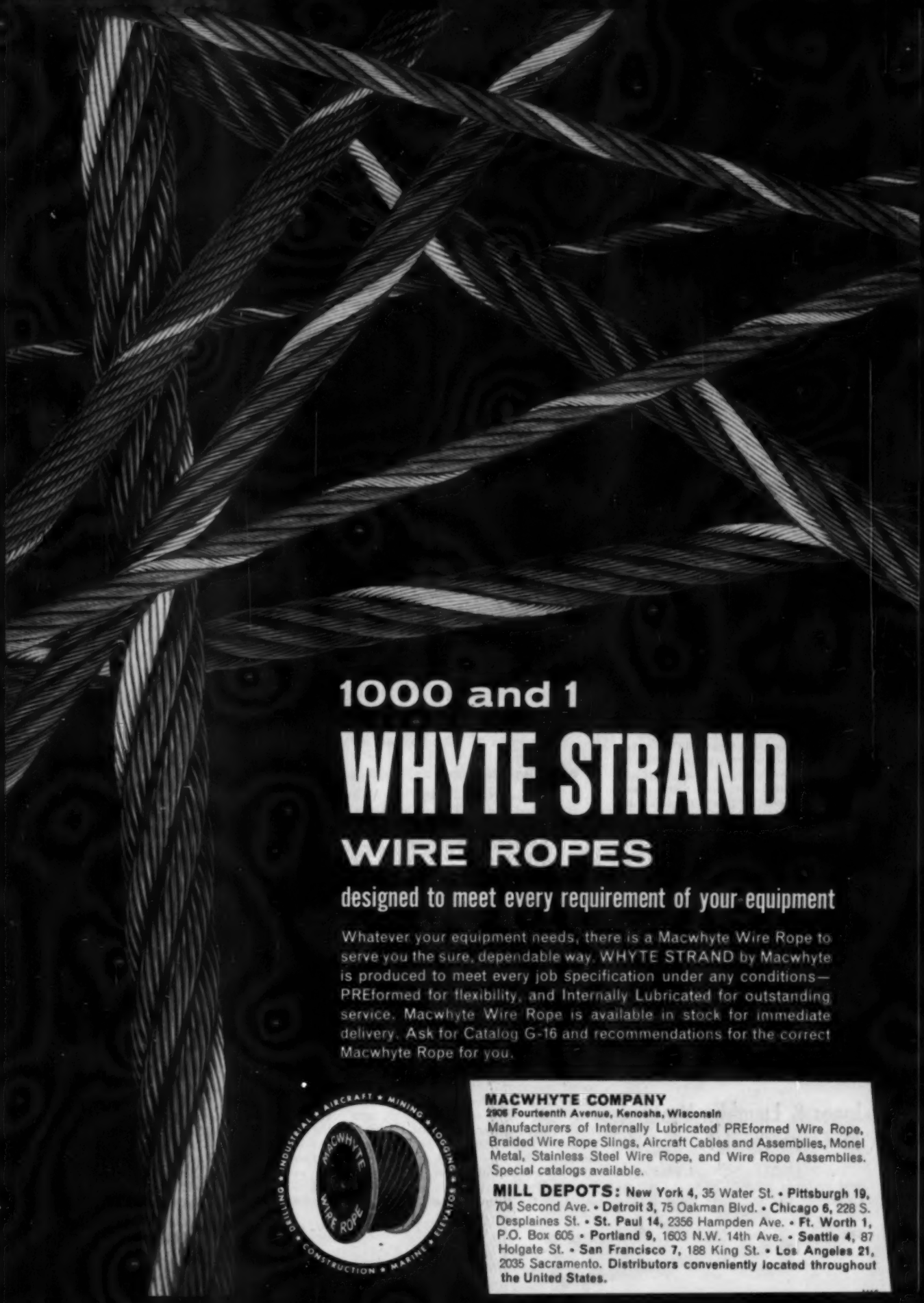
For Topics That Will Be Making the News Read 'This Month in Coal' In the New Four-Page Front-of-the-Book Section.

Rails Facing Battle In Plea For Higher Rates

Guessing in Washington, D.C., this month is that the Interstate Commerce Commission will approve no more than a 7% to 8% further increase in railroad freight rates. The guessing is based on expected hot opposition by shippers and by the National Coal Association as rails carry their plea for an overall 22% boost first to ICC regional hearings in April, then to all 11 ICC commissioners on May 1.

Specifically, eastern carriers are seeking 15% in addition to a 7% emergency increase granted in December and made effective Dec. 28. Western carriers are asking 17% in addition to a 5% emergency



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increase effective the same date (*Coal Age*, January, 1957, p 122). Southern railroads, who sought the emergency increase later than the other two big groups, are still waiting for it. But they, too, are expected to ask for the additional 15% before final action begins.

The trail of freight rate boosts began last September when eastern and western railroads sought premission from the ICC to increase rates 15%, with certain holddowns. In November they petitioned for the emergency 7% as immediate relief from wage increases while the ICC studied the larger rate request. Granted the emergency rates rails then asked for the present 15% and 17% requests. But ICC replied that it considers the emergency increase part of the 15% hike originally sought by the lines. Rails answered not so, and claimed that an overall 22% boost is what they are seeking.

For coal the December 28 emergency freight rate increase meant a 10-cent a ton boost in line haul coal and coke, 5 cents for lignite and 5 cents for export coal, although the ICC had authorized a 10-cent boost for export coal.

The present request would mean a 5-cent a ton increase on line haul coal, coke and lignite. No further increase is being asked on export coal. If the railroads get the additional increase it will mean a total increase on coal of 15 cents a ton for line haul coal and coke, 10 cents on lignite, and 10 cents on export coal.

Coal Continues Trek To Waterside Sites

Coal, along with the nation's other major industries continued the trek to waterside sites in 1956 in greater numbers than in any other year, reports the American Waterways Operators, Inc. A growing demand for waterside sites, according to the waterways organization, is being caused by rising railroad freight rates, mass production, mass distribution, and low cost electric power produced by waterside generating stations.

In the last quarter of 1956 sites were acquired by coal interests in Liverpool, Ill., on the Illinois Waterway by the Illinois Coal Docks Corp. for a barge terminal; in Chelyan, W. Va., on the Kanawha River by the Kanawha River Docks & Mining Co. for a coal loading terminal; in Caseyville, Ky., on the Ohio River by the DeKoven Coal Mining Co. for a coal dock and a mile-long endless belt loader; on Powhatan Point, Ohio, on the Ohio River where a $10 million coal mine expansion is underway; at Graham Station, W. Va., on the Ohio River, by the Ohio River Co., for a coal terminal expansion; at Port Birmingham, Ala., on the Warrior-Tombigbee Waterway for a DeBardeleben Coal Co. barge terminal.

Jones & Laughlin Vesta 4 To Close April 1

The 53-yr-old Vesta No. 4 mine operated by Jones & Laughlin Steel Corp. in California, Pa., will close April 1. The closing will force the layoff of 790 employes, most of whom are members of Local 2399, United Mine Workers of America. Vesta No. 4 produced more than 82½ million tons of coal during its mining lifetime, and operated at a rate of 8,700 tpd. By closing the mine now, Jones & Laughlin said, the company would be shuttering a "grossly uneconomic operation." After 53 yr the mine has become depleted to an extent that there is no longer enough operating area to support a daily production that will meet the requirements of J&L's district steel mills for high-volatile metallurgical coal. An adjacent operation, Vesta No. 5, however, will continue to operate. Because of the shape of the entire Vesta property, it has become impractical to continue joint operations of both Vesta 4 and 5. As operations have advanced the Vesta operation has become progressively narrower in width, making joint operations impractical.

J&L's resulting tonnage loss is expected to be made up by increasing production at the company's Shannopin mine on the Monongahela River, Poland, Pa. Coal from Shannopin, in fact, is expected to make it possible to continue operating the Vesta coal preparation plant at near capacity. Shannopin's production will be barge-shipped to the plant where it will be washed along with coal from Vesta No. 5. As a result J&L expects to increase by only 15% its purchases of

Program, 1957, AIME Annual Meeting Coal Division

Feb. 25-27, Roosevelt Hotel New Orleans, La.

Mining and Geology Session—Monday, 9:30 a.m., February 25

"Basic Coal Composition and Its Relationship to Preparation and Carbonization" by William Spackman, Jr., Andre H. Brisse and W. F. Berry.
"Mine Mechanization in Alabama" by Henry J. Hager.
"Continuous Mining in Pitching Seams" by R. M. Von Storch.

Mining and Economics Session—Monday, 2:30 p.m., February 25

"Coal for the Steam Plants of the Southeast" by Ralph E. Kirk.
"Steam Pollution Legislation of Importance to the Coal Mining Industry" by Henry F. Hebley and James R. Garvey.
"Application of Industrial Engineering Principles to Bituminous Coal Mining" by T. Carl Shelton, Jr.

Materials Handling and Safety Session—Tuesday, 9:00 a.m., February 26

"Developments in Belt Conveyors for Mining" by William Hanson.
"Progress in Safety Engineering at Alabama Coal Mines" by Lawrence Henderson.
"The Role of the Federal Coal Mine Safety Board of Review" by E. R. Price.

Coal Division Luncheon—Tuesday, 12:15 p.m., February 26

Speaker: Edward Steidle, chairman, Federal Coal Mine Safety Board of Review.
Topic: "Round the World Observations."

Dust Collection and Drying—Wednesday, 9:00 a.m., February 27

"Dust Collection with the Microdyne" by A. Lee Barrett.
"Thermal Drying Costs for Fine Coal" by Harry Washburn, George L. Judy.
"Combined Air Cleaning and Heat Drying of Coal" by F. P. Calhoun.

Washing—Wednesday, 2:00 p.m., February 27

"The Convertol Process" by William L. McMorris and Andre H. Brisse
"Viscosity as a Factor in Dense-Medium Cleaning of Coal" by H. F. Yancey, J. M. West, M. R. Geer, and M. Sokoski.
"Chance Cone Operation at Mathies Mine" by D. H. Davis.
"Coal Flotation with Liquid Hydrocarbons" by S. C. Sun and D. R. Mitchell.

BEAR IN THE BORROW PIT

THIS D9 LOADS SCRAPERS WITH 25 HEAPED YARDS IN 45 SECONDS

Phil Dudenhoefer, grade superintendent, knows from production charts that the D9 pusher loads more yards faster, at lower cost.

Working near Eau Claire, Wis., on a highway relocation job, L. G. Arnold, Inc., cut cycle times and boosted yardage with a Caterpillar D9 Tractor push-loading a CAT* DW21 and No. 470 Lowbowl Scraper.

On a round-trip haul of 3 miles they averaged 100 cu. yd. per hour—4 heaped loads of 25 cu. yd. each. Loading time on overburden, with the mighty D9 pushing, was an average of only 45 seconds.

Phil Dudenhoefer, grade superintendent for L. G. Arnold, Inc., says, "I've got both feet right in the dirt, where I record output and performance of every machine. With the D9 as pusher, the DW21-No. 470 unit is outproducing by far any other equipment on the job."

That experience has been shared by hundreds of owners, as more and more D9 Tractors have gone to work in borrow pits or on stripping operations. For fast loading you simply can't beat the D9, with its 320 HP at the flywheel and maximum drawbar pull of 98,000 pounds. Power-boosted controls and excellent visibility make this giant one of the easiest of all tractors to operate. It's available either with torque converter or direct drive with oil clutch. Maintenance is easy, too. And it's ruggedly built to lick the world's toughest jobs.

Your Caterpillar Dealer can show you actual performance records of higher production at lower cost per yard. He'll give you a demonstration right on the job. And he stands behind the long life of every machine with reliable service and parts you can trust.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

HEAVY-DUTY EARTHMOVERS FOR THE HARD WORK

Preparation Facilities

Lincoln Anthracite Co., Pine Grove, Pa.—Contract closed with the Deister Concentrator Co. for eight SuperDuty diagonal deck coal washing tables and one Concenco revolving feed distributor. Six of the tables will handle No. 4 buck, one will handle No. 1 buck, one No. 3 buck anthracite.

Peca Bros., Mahanoy City, Pa.—Contract closed with the Deister Concentrator Co. for three SuperDuty diagonal deck coal washing tables, one for No. 4 buck and two to handle No. 3 buck anthracite.

Semet Solvay Div., Allied Chemical & Dye Corp., Harewood, W. Va.—Contract closed with the Kanawha Mfg. Co. for a middlings crushing and recirculating system comprising a Low-Head vibrating screen, an American rolling ring crusher, a Deister four-way mechanical distributor, and a pump and piping circuit for delivering to existing Deister tables. Capacity 130 tph, completion May 31, 1957.

Harmon Creek Coal Co., Burgettstown, Pa.—Contract closed with the Fuel Process Co. for a cleaning plant that will include necessary conveying, screening and dewatering facilities to wash approximately 30 tph of ⅝x¼ coal in a Belknap Type C2 washer. This is in addition to the present Belknap coal washing system. Probable date of completion, April 1, 1957.

Jerry Fork Coal Co., Summersville, W. Va.—Contract closed with the Fuel Process Co. for a Belknap heavy media washer to handle approximately 150 tph.

Wyatt-Seanor Coal Co., Seanor mine, Saltsburg, Pa.—Contract closed with the Daniels Co., Contractors, Inc., for dense media facilities in addition to previous DMS facilities to increase the capacity of the present preparation plant and to handle 2½x¼ coal. Overall capacity of the plant, 300 tph. Probable date of completion, Jan. 31, 1957.

Green-Clintwood Coal Co., Clintwood-Dickinson County, Va.—Contract closed with the Deister Machine Co. for five Deister machine Plat-O coal washing tables to wash ¼x0. The equipment represents treatment of approximately 60 tph. Completion date, January, 1957.

southern West Virginia coal for its steel mills.

Island Creek Acquires Algoma Coal & Coke Co.

From its fourth place spot in the national tonnage lineup of top producers, Island Creek Coal Co. last month reached for and got enough additional potential tonnage to assure itself fourth position again by the time 1957 has ended.

By picking up the Algoma mine operated by the Algoma Coal & Coke Co. in West Virginia's McDowell County, Island Creek gained at least 400,000 tons a year based on Algoma's current rate of production. For Island Creek, however, the eventual production gain would be much more. On the day of the acquisition, Jan. 1, Raymond E. Salvati, president of Island Creek, disclosed plans to expand Algoma's production rate. Last year the mine produced an estimated 285,000 tons. Island creek's own tonnage in 1956, also estimated, was 14,778,600 tons.

Last month's acquisition, according to an announcement by Mr. Salvati and by William Beury, president of Algoma, was for an undisclosed amount of cash and common stock.

Algoma Coal & Coke has been a producer for more than half a century. It was well known for its Pocahonta No. 3 seam coal. Sold under the name "The Great Algoma," the coal has been purchased in metallurgical, export and domestic heating markets.

In 1955 the Algoma mine produced 311,894 tons at a rate of 2,500 tpd. It employed 450 employees on a single shift and had a life expectancy of 30 yr. Completely mechanized above and below ground, the mine is served by the Norfolk & Western.

In announcing the acquisition Mr. Salvati said, "Island Creek heretofore has not had mines producing from the Pocahontas No. 3 seam. The Algoma production, which we plan to increase substantially, is a welcome addition to the other kinds of quality coals being marketed by Island Creek."

Mr. Beury, who will become affiliated

FORMAL CEREMONY completing the acquisition of the Algoma Coal & Coke Co., McDowell County, W. Va., by Island Creek Coal Co., saw company officials attach signatures to papers effecting the sale. Seated: W. C. Nelson (left), vice president of Island Creek; J. L. Hamilton, executive vice president of Island Creek; William Beury, Algoma president; R. E. Salvati, Island Creek president; and A. L. Lynn, vice president, Island Creek. Standing, John B. Gallaudet and George Richardson, Algoma treasurer and attorney; R. W. Laxson, administrative vice president; F. A. Macdonald, assistant general counsel; Rolla D. Campbell, general counsel, all Island Creek; and C. R. Mabley Jr., president, Island Creek Coal Sales Co.

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Dependable POWER

for Ore and Rock Processing

Apply the many cost-saving features of Allis-Chalmers deep rib motor in a variety of processes... both indoors and out.

Here's why these motors offer more dependability in quarrying and mining operations:

MORE Cooling Surface — Rib-type design provides reserve cooling capacity—an important factor in dirty locations.

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MORE Copper — Greater use of copper increases electrical life.

MORE Lubrication Provisions — Large grease reservoirs surround bearings. Provision made for in-service lubrication — important where moisture or corrosive vapors contaminate grease.

Rib-Type MOTORS

1 to 100 hp

Allis-Chalmers offers rib construction in all enclosed motors from 1 to 100 hp (through frame 505). To find out more about A-C motors, contact your nearby A-C distributor or district office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

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with the Island Creek organization, had this to say: "Island Creek's plans to expand output from the Algoma property will, in this day of increasing demand, benefit Algoma's customers as well as Island Creek's."

Unions, Maritime Board Tie Up ACS Vessels

Caught in the crossfire of a jurisdictional dispute among maritime unions, American Coal Shipping, Inc., last month found its ships tied up in port so effectively that only one vessel had been put into coal service since the company's formation last summer.

Thirty other vessels, all Liberty ships chartered from the government's reserve fleet, were in various stages of delay as a direct result of a fight among seamen's and officers' unions.

Three of the ships were being refitted at east coast shipyards on an off-on basis after court injunctions—later set aside—had prevented picketing. Three more ships in another east coast yard were ringed with picket lines pending similar anti-picketing injunctions.

Perhaps the biggest blow to ACS came from the government itself. The remaining 24 Liberty ships, as yet undelivered and riding at reserve fleet anchorages, were ordered held at anchor until the labor dispute had been settled. The order to withhold them came from Clarence G. Morse, chairman of the Federal Maritime Board.

Another fleet of ACS vessels, 15 freighters acquired when the company bought A. H. Bull & Co. for $40 million last December, were not involved in the jurisdictional troubles. The ships were being operated in the Bull Line service to the Caribbean.

The inter-union blows began falling last October when ACS signed contracts with two unions to supply seamen and officers as the government's Liberty ships were delivered. The unions were the National Maritime Union, which had been commissioned to furnish unlicensed seamen, and the Marine Div., Local M-124, a Virginia affiliate of District 50, the United Mine Workers of America.

Immediately, two AFL-CIO unions—the Masters, Mates & Pilots, and the Marine Engineers Beneficial Association began picketing ACS at its New York office, promising an extension of the picketing to the company's ships. Both unions charged that ACS, urged by John L. Lewis, had welched on "assurances" of contracts covering officers and engineers (*Coal Age*, December, 1956, p 126).

By the end of November strife among the unions, themselves, had begun. The Masters, Mates & Pilots broke off a 20-yr alliance with the National Maritime Union, charging that the NMU had not supported the MEBA.

Eight days later the NMU (and ACS) was hit from another side—this time by the Seafarers International Union, Atlantic and Gulf district, which, like the NMU, supplies unlicensed seamen.

Appearing before the National Labor Relations Board, the Seafarers charged ACS with unfair labor practices because, the Seafarers said, ACS had recognized the NMU as bargaining agent for unlicensed personnel before actual employment. New picket lines—this time Seafarers union members—turned up at ACS ships.

But whether ACS was guilty of unfair labor practices—or guilty of a later charge of "discrimination" against Seafarer applications for jobs—seemed nearly incidental. The NMU and the Seafarers unions are old enemies. The NMU, a member of the old CIO, and the Seafarers, a member of the old AFL, have engaged in union warfare before. Only

SEEKING TO BOOST FORMOSA OUTPUT, Shen Tso-Hung, mining engineer and special assistant to Formosa's director of coal exploration, is studying mining operations and methods of blasting in the Mount Hope area of West Virginia. Shen first fled communists in China, next in North Korea. With him is Denver S. Griffith, federal coal mine inspector.

VALLEY CAMP COAL CO., Elm Grove, W. Va.—Some 600 employees from No. 3, No. 5 and Alexander mines have completed a safety course conducted by the U. S. Bureau of Mines. Above: E. J. Marron (left), USBM; M. J. Meckling, safety director, Valley Camp; John Gusek, mine committee member; Adolph Pacifico, president, District 6, UMWA; J. B. Yanity, instructor, USBM; Thomas Higgins, supervisor, USBM, St. Clairsville, Ohio; Don R. Haake, mine superintendent; Robert G. Waddell, W. Va. state mine inspector.

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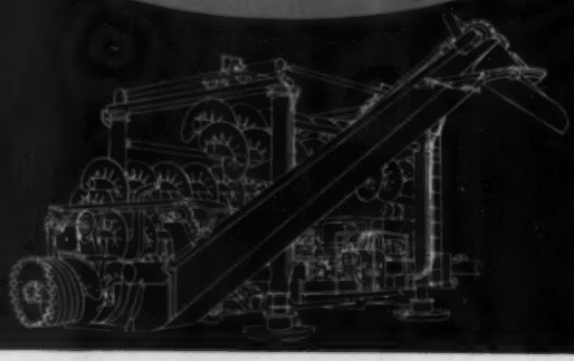

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CLARKSBURG, WEST VIRGINIA

News Roundup *(Continued)*

a meeting of the now joined AFL-CIO executive committee in Miami late last month seemed a possible instrument for clearing away the tangled lines of inter-union strife.

Meanwhile, ACS was fighting the tieup as best it could—with court injunctions and a damage suit. It could not seek the services of the Federal Mediation and Conciliation service since the dispute is between labor unions and not between management and labor.

Through injunctions—some set aside—ACS was able to keep alive its struggle to get its ships underway. Refitting its Libertys was evolving into an on-again, off-again job. In Charleston, S.C., an injunction it obtained against the Seafarers forbidding picketing was set aside by another court order. Its two Libertys, the Cleveland Abee and the Walter Hines Page, have been tied up at Charleston Shipyards, Inc., since early December.

In Savannah, Ga., where two more ships have been lying idle awaiting repairs ACS has brought a $34,000 damage suit against the Masters, Mates & Pilots and the Marine Engineers Beneficial Association. An injunction against picketing had been sought, but was denied. In its damage suit ACS charged that the two unions had been involved in actions "in the nature of a secondary boycott" in violation of the Taft Hartley Act. It said that ACS lost money because of the picketing and "other acts" encouraging employes of the Savannah Machine & Foundry Co. not to work.

As January ended the tangled jurisdictional strands of maritime unions had lashed down ACS ships in a taut web of confused strife. The immediate future for ACS? Only delay.

Scranton Mayor Seizes Diamond Colliery Mine

In Pennsylvania last month Scranton's Mayor James T. Hanlon, accompanied by Scranton's chief of police and 15 patrolmen, seized the West Scranton mine of the Diamond Colliery Co. The Mayor charged the company with illegal deep mining.

The seizure and the charge were the result of vigorous protests by Scranton residents who had demanded that the mine be closed on the ground that a number of homes had been damaged because of cave ins.

Mayor Hanlon acted under the Fowler-Kohler Mine Cave Act of 1921, which, he said, requires mine operators to file mine operations maps with the city administration. If an owner fails to comply the same act permits closure, according to Mayor Hanlon.

Joseph Govannini, president of the mining company, indicated he would enter a court action in an attempt to nullify the Mayor's seizure. He admitted that his company "may not have filed mine operation maps with Scranton City," but added that "such maps were readily available at the company office." Later

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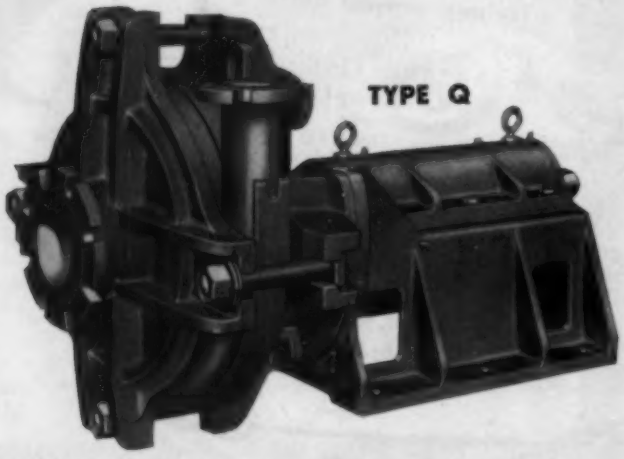

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News Roundup *(Continued)*

he said that the coal firm would file maps with the city.

The vigorous protests of residents developed last month soon after a man and his wife had been found asphyxiated in their home, reportedly from gas leaking from a pipe leading from the street. Residents in the area blamed the break on a mine cave.

Mr. Giovannini denied he was operating illegally. "We own all the surface and coal in the mines," he said. "We are not operating illegally." He declared that none of the mine operations are in the area where West Scranton residents have claimed damage to their homes. He added that operations are more than a half mile from the home of the asphyxiated couple.

The mine closed by Scranton's mayor formerly was owned by Glen Alden Corp. It was purchased from Glen Alden by the Robert Y. Moffat coal interests. The Diamond Colliery Coal Co. bought the operation from Moffat Coal Co. last year.

The only other seizure of a coal company operation for illegal mining in Scranton occurred in 1920 when the Oxford mine of the People's Coal Co. was closed—again by Scranton's Mayor. During the 1920 seizure officials and employes of Oxford battled police to prevent the closing. Mine caves over workings of the Oxford company reportedly wrecked scores of properties in the business section of the city.

News Briefs

Eastern Gas & Fuel Associates is preparing to boost production of its Federal No. 1 mine in Grant Town, W. Va., from 10,000 tpd to 12,500 tpd.

The 25% production increase will result from improvements, according to H. John Harper, vice president of Eastern in charge of mining operations. Work has already begun on a 267-ft shaft from the mine's preparation plant to the working level of the Pittsburgh seam. It will be situated near the present main hoisting shaft. A skip-hoisting system will be installed in the new shaft instead of self-dumping cages as in the present hoist. Completion is scheduled in about a year.

Pittston-Clinchfield Coal Corp. bought the Black Eagle mine, Wyoming County, W. Va., owned by Jones & Laughlin Steel Corp.

The mine is being operated by the Amigo Smokeless Coal Co., a subsidiary of Pittston-Clinchfield. In announcing the purchase the companies did not disclose the price, but said transfer of ownership had become effective early in January. In 1956 Black Eagle produced at a rate of 1,500 tpd. It has a life expectancy of 15 yr and employs 230 men.

Martin F. Brennan has been named acting executive secretary of the Anthra-

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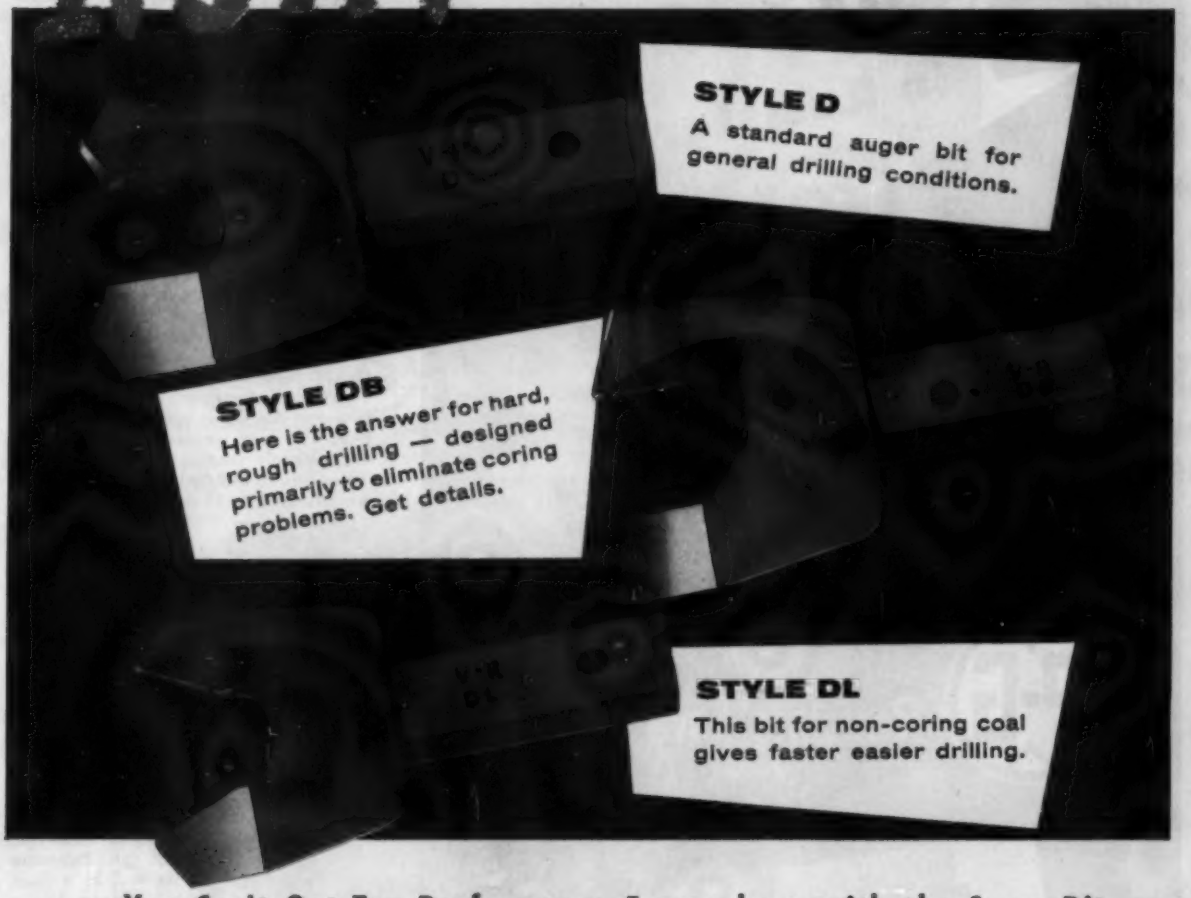
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News Roundup *(Continued)*

cite Health and Welfare Fund.

Mr. Brennan is a member of the fund's three-man board of trustees and president of District 7, United Mine Workers of America. Thomas Kennedy, international vice president, says Mr. Brennan will serve until a permanent replacement is found for Paul D. McNelis, who died Dec. 29.

Simpson Coal & Chemical Co. has acquired Wood Pocahontas Mining Co., Besoco, W. Va.

The purchase was accomplished through a stock acquisition in which the Simpson company took over 100% of the Wood Pocahontas shares. New officers of the Wood Pocahontas Mining Co., which will retain its corporate identity, will be Paul Bock, president; C. A. Goldschmidt, vice president; Karl J. Schumer, secretary; and Alfred A. Adrian, treasurer. Wood Pocahontas produces from Pocahontas No. 2, 3, and 6 seams. Its daily output is about 800 tons. The new owners intend to install a completely mechanical mine and increase output to 2,000 tpd. Total reserves are estimated at 15 million tons.

Dravo Corp. will erect the largest coal barge unloading tower ever built.

Commissioned by the city of Memphis, Tenn., to build the structure, the Pittsburgh barge and dock building company will erect twin towers resting on a single base to unload barges bringing coal to an 812,500-kw electric power plant Memphis will build on McKellar Lake off the Mississippi River. The unloader will be equipped with two separate booms, each with a 13.3-ton capacity bucket. Each boom will be designed for a free-digging capacity of 1,300 tph, or an average rate of 850 tph. Incoming coal barges will be moored at a dock while unloading buckets, suspended from trolleys, scoop up coal to carry it back along the booms to two separate hoppers. The buckets discharge into the hoppers, which, in turn, feed conveyor belts leading to the power plant and storage areas. The booms will be made unusually long, since the trolleys must be designed to operate above two 35-ft wide, 1,500-ton barges moored side by side. Thus, the booms will extend more than 70 ft beyond the dock face. From pool level coal will be lifted about 90 ft. Memphis, currently served up power by the Tennessee Valley Authority, will generate its own power for the first time in 1958. The plant will be the largest ever constructed by a municipality. Already under construction, it will be operated by the Light Gas & Water Div. of the city of Memphis.

Bituminous Coal Research, Inc., will hold its annual meeting and techno-sales conference April 18 and 19 at the Greenbrier Hotel, White Sulphur Springs, W. Va.

A committee composed of the following men will plan and conduct the two-

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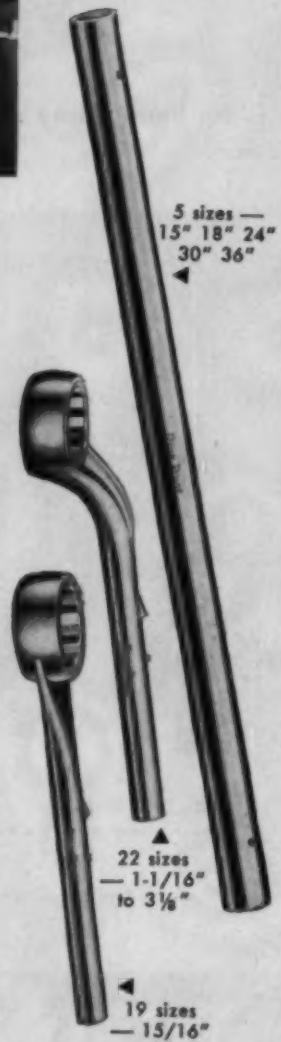

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News Roundup (*Continued*)

day conference: Stanley B. Johnson Jr., president of the Lorado Coal Mining Co.; Henry C. Woods, chairman of the board, Sahara Coal Co.; Dr. C. E. Lawall, vice president, coal traffic and development, The Chesapeake & Ohio Railroad Co.; W. W. Bayfield, executive vice president, American Coal Sales Association; and John W. Igoe, assistant director, administration, BCR.

Construction of a steam generating plant by the Washington State Power Commission might necessitate the state's entry into the coal mining business.

Asked to quote a firm price on coal under a long term contract, the Northwestern Improvement Co, which produced 2,000 tpd from the principal mines in the Cle Elum-Roslyn area where the proposed plant would be built, countered with a proposal late in December that the state buy the company's mining equipment and lease its property. The company then would operate the mines for the state. Quoting a firm long term price "when John L. Lewis raises our wage rates each year" would be impossible, said Earl R. McMillan, company manager. Later in the month, Dec. 27, Northwestern Improvement Co. was dissolved by its parent, Northern Pacific Railway Co., which assumed all debts, liabilities, contracts and obligations, then had transferred to its own name nearly all the properties of Northwestern Improvement. Meanwhile, the Washington power commission, in the first step toward construction of its generating plant is seeking an appropriation of $275,000

(*Continued on p 174*)

COAL MEN ON THE JOB . . .

OLD BEN COAL CORP.—No 9, Mine, West Frankfort, Ill.

Larry Green, washer foreman, and Reuben Flatt, top foreman, confer in office at cleaning plant. Short wave radio speeds communication with main office, shop or supply house.

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- Produces less fines in face preparation
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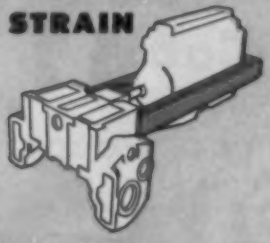

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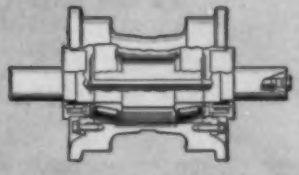

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Current Coal Patents

by OLIVER S. NORTH

No. 2,775,346

METHODS AND APPARATUS FOR SEPARATING SOLIDS HAVING DIFFERENT SPECIFIC GRAVITIES, K. F. Tromp, Dec. 24, 1956—Improvements in method and apparatus used for separating solids having different specific gravities, especially run-of-mine coals. Horizontal, rectilinear currents are set up in the tank. With a suitable mechanism, the suspension of middlings is discharged in two portions. Better separation of coal from slate is said to be accomplished thereby.

No. 2,775,439

CUTTER HEAD FOR DRIVING CROSSCUTS, T. F. McCarthy, Dec. 25, 1956—An improved method and apparatus for driving crosscuts or breakthroughs in coal mine pillars. A pilot hole is driven through the pillar, and a cutting head secured to the projecting end of the drill tool. The tool is rotated during withdrawl from the pilot hole, so that the cutter enlarges the hole to required size.

No. 2,776,018

SPEED REDUCTION DRIVE AND CHAIN TENSIONING DEVICE, R. C. Lundquist (assigned to Goodman Mfg. Co., Chicago, Ill.), Jan. 1, 1957—In a simple and efficient chain and sprocket drive for loading machines of the type used in coal mines, increased clearance between sprocket and drive is attained by recessing the shaft driven from the sprocket.

No. 2,777,526—No. 2,777,530

LOW HEIGHT MINE HAULAGE VEHICLE, V. I. Dudley (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Jan. 15, 1957—An improved shuttle car especially designed for use in coal mines having low headroom.

No. 2,777,565

CONVEYOR MECHANISM FOR MINING APPARATUS, J. F. Joy (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Jan. 15, 1957—Design for an improved conveyor mechanism especially suitable for use with a square-face loop cutter type miner and having effective means for guiding and driving the endless conveyor element irrespective of the angular position of the discharge end portion of the conveyor.

No. 2,777,679

RECOVERING SUB-SURFACE BITUMINOUS DEPOSITS BY CREATING A FROZEN BARRIER AND HEATING IN PLACE, F Ljungstrom (assigned to Svenska Skifferolje Aktiebolegat, Orebro, Sweden), Jan. 15, 1957—A European process for underground gasification of bituminous materials, such as coal and oil shale, requires first the freezing of surrounding formations in every direction, to prevent water from seeping into the bituminous formation and to retain combustion products derived by heating the mineral body.

No. 2,776,879

GASIFICATION OF SOLID CARBONACEOUS FUEL, W. Gumz (assigned to Hydrocarbon Research, Inc., New York, N. Y.), Jan. 8, 1957—An improved fluidized-bed method of producing fuel gas from solid carbonaceous fuels which and to agglomerate on heating, for example, caking coals and lignite.

No. 2,777,681

MINING AD LOADING MACHINE WITH UPPER AND LOWER RELATIVELY MOVABLE DISINTEGRATING HEAD PORTIONS, C. F. Ball (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Jan. 15, 1957—An improved continuous coal mining and loading apparatus wherewith a face can be readily mined and loaded out with a minimum number of positioning movements during its operation.

No. 2,777,917

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Coal Patents *(Continued)*

MINE LOCOMOTIVES, E. C. Whitfield (one-third each assigned to J. C. Whitfield and A. C. Whitfield, both of Kitts, Ky.), Jan. 15, 1957—A safety appliance for reducing the occurrence of electrical discharges in the trailing cable or supply cable of a mine locomotive between the locomotive and the fixed trolley wire from which power is drawn.

No. 2,776,033

PORTABLE BELT CONVEYOR, R. Lo Presti (assigned to Goodman Mfg. Co., Chicago, Ill.), Jan. 1, 1957—An improved portable conveyor section for use in the continuous mining of coal by room and pillar methods. The supporting wheels are so spaced and located that when a string of sections are bolted together the assembly will maintain its alignment, that is, it will not "snake."

No. 2,776,040

CONTINUOUS AUTOMATIC FLEXIBLE CONVEYOR, C. H. Snyder (assigned to The Colmol Co., New Lexington, Ohio), Jan. 1, 1957—In an automatic coal mining machine, the conveyor system is supported on a flexibly coupled train of self- contained vehicular units and attached to the machine, so that the guiding and operation of the mining machine guides and operates the conveyor train. Production time usually lost due to shuttle device changes is eliminated.

No. 2,776,123

BORING TYPE MINING HEAD HAVING ECCENTRIC WEDGE, C. H. Snyder (assigned to The Colmol Co., New Lexington, Ohio), Jan. 1, 1957—A design for an improved eccentric head for use on large augers for highwall mining or on the front of a continuous coal mining machine.

No. 2,776,124

RECTRATABLE BORING HEAD FOR MINING MACHINES, H. E. Smith (assigned to Goodman Mfg. Co., Chicago, Ill.), Jan. 1, 1957—A design for a coal machine boring head structure having a simple seal against ingress of water from sprays or the like.

No. 2,776,125

MINING MACHINE WITH COLLAPSIBLE CUTTER HEAD, J. S. Robbins and C. A. Wilms (assigned to Goodman Mfg. Co., Chicago, Ill.), Jan. 1, 1957—In an improved construction for mounting the idler sprockets on a coal mining machine of the McKinlay type, the corner sprockets can be selectively retracted.

No. 2,776,126

MINE FACE TRAVERSING MINING HEAD, A. R. Anderson (assigned to The Colmol Co., New Lexington, Ohio), Jan. 1, 1957—A design for a

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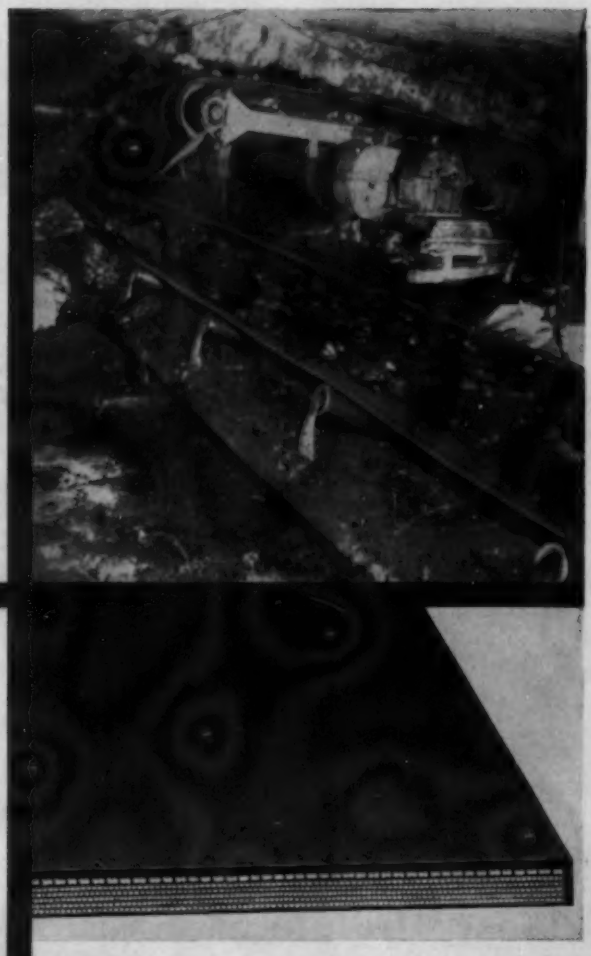

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Quaker Rubber's fire-resistant, flame-retarding belt actually *exceeds* the U. S. Bureau of Mines essential standards for underground mine safety.

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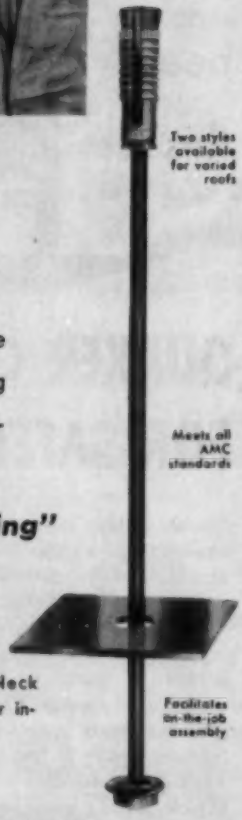

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Coal Patents *(Continued)*

continuous coal mining machine which will change direction automatically whenever it reaches its limit of travel in any direction.

No. 2,776,127

CONTINUOUS MINER HAVING VERTICALLY ADJUSTABLE RIPPER HEAD, R. C. Lundquist (assigned to Goodman Mfg. Co., Chicago, Ill.), Jan. 1, 1957—A continuous mining machine having an adjustable ripper head that enables the operator to take advantage of horizontal cleavage or bedding planes in the coal face and produce a greater portion of lump coal than is generally possible with machine of the ripper head type.

No. 2,776,506

APPARATUS FOR MEASURING THE FLOW RATE OF PARTICULATE SOLIDS, B. L. Schulman and W. G. May (assigned to Esso Research & Engineering Co.), Jan. 8, 1957—The apparatus described is suitable for metering flow of particulated solids, such as pulverized coal or coke, being transported in an aerated state.

No. 2,776,809—No. 2,776,823

METHOD OF AND APPARATUS FOR MINING BY DRILLING, CORING, AND BREAKING, A. L. Barrett (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Jan. 8, 1957—An improved continuous coal mining machine has a combined drilling and core-cutting disk carrying cutters both on its front face and circular peripheral edge. The coal is drilled by an axial motion of the head, and thereafter is cut and broken away by a lateral swinging motion of the head.

No. 2,776,824—No. 2,777,102

HYDRAULICALLY OPERATED CYCLING DEVICE FOR A MINING MACHINE, E. J. Osterhus, A. W. Richards, and N. W. Taylor (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Jan. 8, 1957—A design for a substantially automatic control means for moving the vein-attacking and disintegrating instrument of a coal mining machine through a repeating cycle of operation. Better roof and floor control and maximum mineral recovery can be effected by use of automatic operation.

No. 2,772,869

CONTRACTIBLE BORING TYPE CUTTING HEAD FOR CONTINUOUS MINING MACHINE, B. F. Tracy (assigned to Goodman Mfg. Co., Chicago, Ill.), Dec. 4, 1956—A design for a hinged boring arm structure having maximum collapsibility and particularly adaptable to small bore machines used for mining low seams of coal.

No. 2,772,870

ROTARY BORING HEAD HAVING RADIALLY ADJUSTABLE

CUTTING ARMS, E. L. Anderson and E. J. Hlinsky (assigned to Goodman Mfg. Co., Chicago, Ill.), Dec. 4, 1956—In a mining-machine boring head structure, the telescopic end portions at the outer end of the arms have splined engagement with the hub portion, to provide stability against twisting stresses during cutting.

No. 2,772,871

SAFETY ROOF CONTROL APPARATUS FOR CONTINUOUS MINER, K. E. Caine (assigned to Goodman Mfg. Co., Chicago, Ill.), Dec. 4, 1956—In a method for protecting timberman and mining machine operator against roof falls, spaced pivoted timber erecting and supporting arms are provided for the machine. These arms elevate and sustain timbers sufficiently in advance of the machine to protect both machine and operator against falling and peeling rock and enable the timberman to work under supported roof.

No. 2,774,462

SPOOLED RIBBON SUPPORTED EXTENSIBLE BELT CONVEYOR, W. N. Poundstone (assigned to Pittsburgh Consolidation Coal Co., Pittsburgh, Pa.), Dec. 18, 1956—A straight-line coal mine belt conveyor which can be installed, extended, retracted, and removed with a minimum of labor and lost production time. The conveyor support is a ribbon of sheet metal, usually pre-troughed, wound about a spool.

No. 2,773,018

CONTINUOUS PROCESS FOR DRYING, PREHEATING, AND DEVOLATILIZATION OF CARBONACEOUS MATERIALS, V. F. Parry (assigned to Solicitor of the Department of the Interior, U.S.A.), Dec. 4, 1956—An economical process for treating low rank fuels, especially lignite, non-coking coals, etc., to produce a high heat value char and coal tar and other distillation products. The ground raw material is dried and carbonized in fluidized beds. The solid char is withdrawn from the carbonizing unit and briquetted or used as power plant fuel, and the distillate is condensed to produce gases, tars and light oils. Waste gases are recycled to the drying and carbonizing units for heat economy.

No. 2,773,394

TOOL CARRYING CHAINS FOR USE ON COAL CUTTERS AND THE LIKE, S. E. Proctor (assigned to Austin Hoy & Co. Ltd., Aylesbury, England), Dec. 11, 1956—In an improvement on the tool-carrying chain disclosed in U. S. patent 2,675,219, the bent portion of the detachable stem of a ball for the ball-joint chain extends longitudinally of the chain instead of at right angles thereto, and will not wear to an oval shape the hole in the link in which it is secured.

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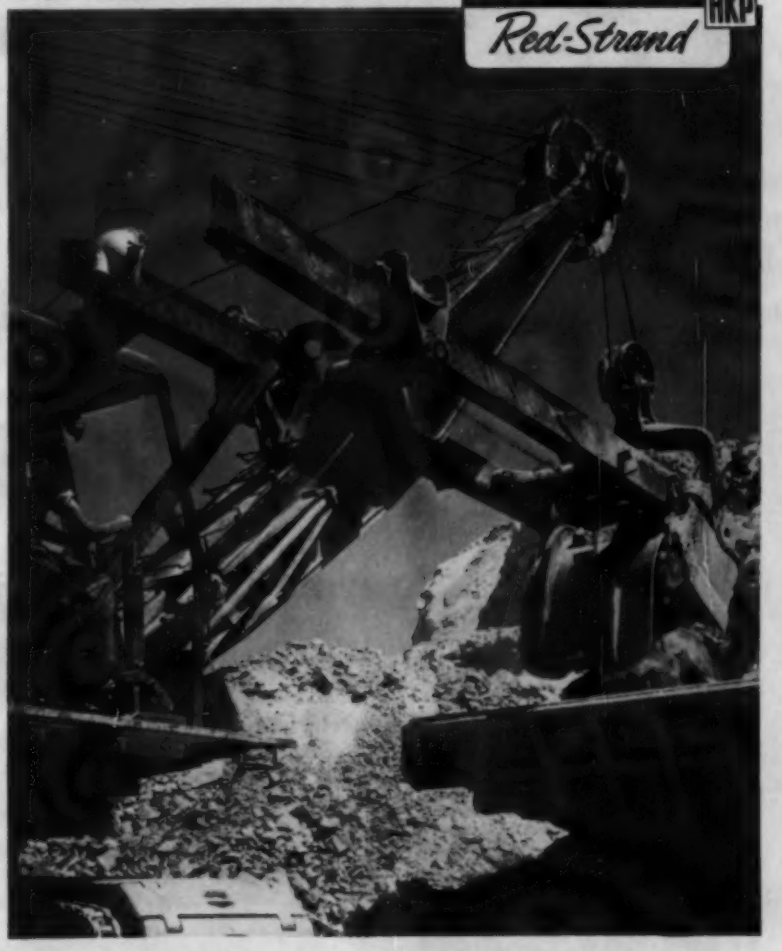

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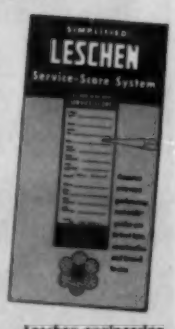

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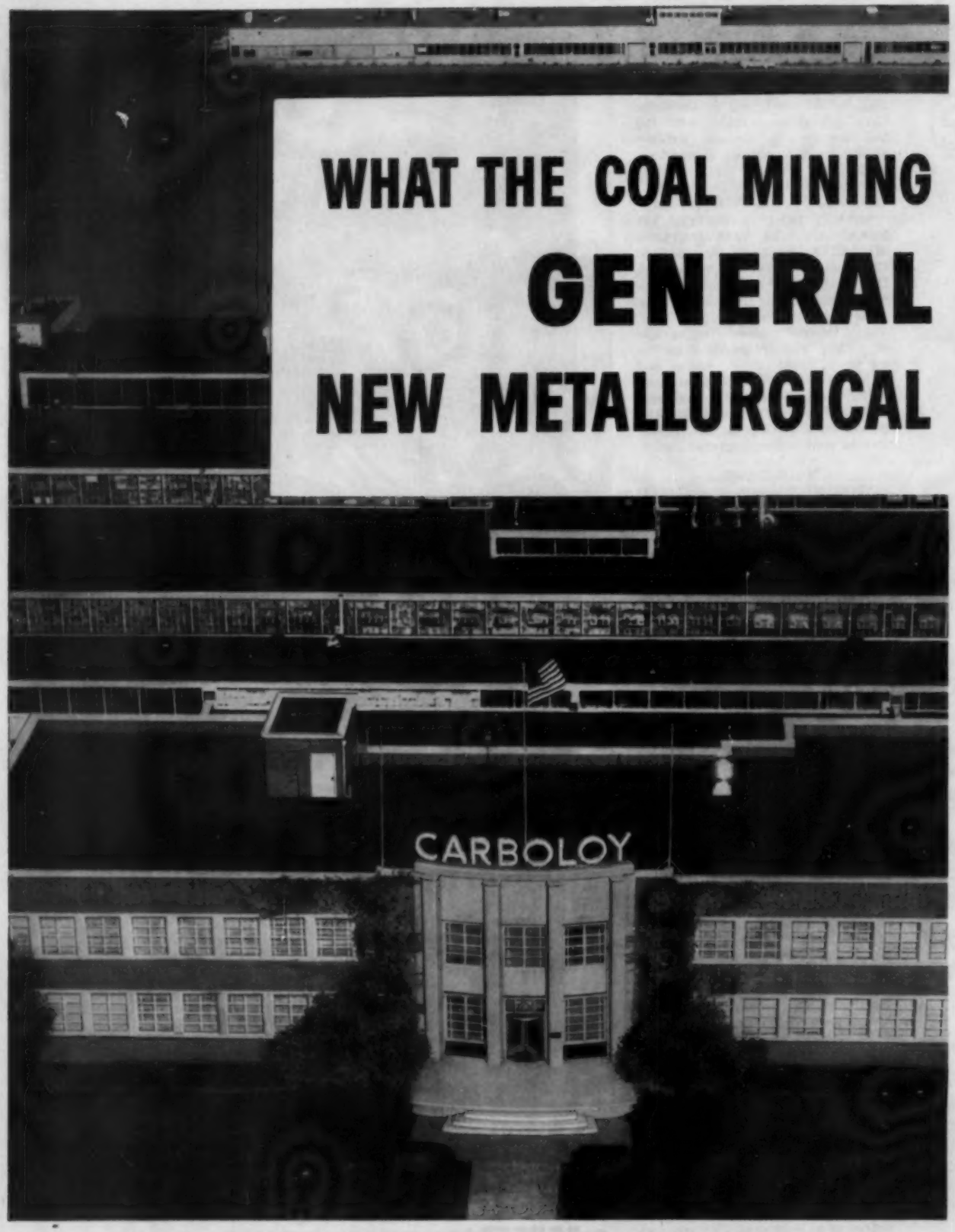


Headquarters of the Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Ave., Detroit 32, Michigan. Carboloy Cemented Oxide and carbides are made here. G-E permanent magnets and specialty resistors are manufactured in the Edmore, Mich., plant.

INDUSTRY CAN EXPECT FROM ELECTRIC'S PRODUCTS DEPARTMENT

The new G-E Metallurgical Products Department is the successor to the Carboloy Department. Here's what this change will mean for you.

Since 1928, the General Electric trademark "Carboloy" has been identified with a brand of cemented carbide. And to the Mining Industry, cemented carbide has become identified with faster cutting, longer wearing drills and bits.

Carboloy® cemented carbides are manufactured by the new G-E Metallurgical Products Department—successor to the Carboloy Department, which was organized to produce this unique metal for industry.

But today, carbides are just one of a broad range of products this Department produces—many of which do not carry the famous Carboloy trademark.

The Metallurgical Products Department also manufactures such products as G-E permanent magnets, thermistors, and Thyrite® varistors which are helping the Mining Industry indirectly, as vital components of modern controls, instruments, separators, and other equipment found in every mine. And other products, like G-E man-made diamonds are on the industrial horizon.

Thus, the new departmental name symbolizes the broadened scope of this Department's activities . . . a scope which will have far-reaching effects on the Mining Industry.

For, General Electric—through its new Metallurgical Products Department and the G-E Research Laboratory—is carrying on basic research into the use of carbides and new cutting-tool materials. Programs with mining-machine builders are in full swing . . . programs which will ultimately bring to mining all the advantages carbides have already brought to metalcutting.

And, when new products and methods are developed for the Mining Industry by General Electric, they will come to you from the Metallurgical Products Department.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Foreign News

GREAT BRITAIN

When the National Coal Board's new 400-tph preparation plant at its Cwm Colliery in South Wales began cleaning its first coal last month it became the 200th plant put into operation by the National Coal Board. During the last 10 yr these plants, capable of treating 68 millions tons per year, together with 107 froth flotation plants for cleaning fine coal, have been installed in Britain at a cost of $112 million. In addition, more than 40 plants with a capacity of 26 million tons per year and costing nearly $53.2 million are now under construction or are being designed.

The coal industry was ill-equipped to provide clean coal when the NCB took over operations in 1947. The coal being mined had been deteriorating for years because of thinner seams and seams containing dirt bands. Few cleaning plants had been built in the period immediately before and during World War II.

Since the war increasing mechanized mining has helped to push up production of deep-mined coal from 181 million tons in 1946 to more than 215 million tons in 1956. But machines indiscriminately mining coal and dirt tend to produce small coal and brought problems of preparation.

The NCB has sought to solve the problems by installing mechanical plants to clean both large and small coal, leaving only the biggest pieces for handcleaning. As a result the quantity of hand-cleaned coal has been reduced from 87 million tons in 1946 to 47 million tons by 1955, despite an increase of 16% in mine output.

The new plants vary in size and the one at Cwn, though considered large, is not exceptionally so by modern standards. Other plants treat 600 tph, 800 tph and the largest, 1,320 tph (Manvers Main in Yorkshire).

Many of the plants use two or three systems to separate coal from dirt: the dense medium process for cleaning coal 1 in and larger; the jigging system, the most popular form of which is the Baum washer; and froth flotation for coal less than 1/50 in.

The entire raw coal output from Cwm Colliery will be cleaned by two processes —the Chance sand flotation process for coal down to 1/16 in and the Fraser & Chalmore "Mineral Separation" froth flotation process for the remaining minus 1/16-in fraction.

It has been in recent years only that the froth flotation type of coal washing has been utilized for cleaning coal as large as 1/16 in. Previously it was believed that the size was too heavy to be lifted by bubbles. But, after extensive research, plants of this type are being operated successfully.

Two qualities, a high and a low sulphur content coal, are being mined at Cwm. Since the output will be used for the manufacture of metallurgical coke, the two qualities are kept separate so an acceptable blend of the two coals, after cleaning, can be obtained from the coke works. It is for these reasons that the Cwm Colliery preparation plant has been made in two separate but identical sections each having a capacity of 200 tph. The two types of coal are conveyed from the pit at a maximum rate of 500 tph and discharged into a 400-ton capacity bunker with two compartments to receive the two qualities of coal. Conveyors then carry the coal to the separation plant's sections.

The plant's refuse is laundered in an 80-ft diameter clarifier tank. With the help of reagents, solids are settled out and drawn off in a thickened state to be passed over vacuum filters. The purpose is to conserve water used in the plant and to fulfill the anti-water pollution regulations of the local River & Water Catchment Authority. The refuse is finally re-stowed underground via machinery installed for the purpose.

Copyright General Electric Co., Ltd., England

200th PREPARATION PLANT put into operation by Britain's National Coal Board since 1947, year when the NCB began operating British coal industry. Plant is situated at the Cwm Colliery, South Wales, and treats 400 tph in two identical sections cleaning 200 tph each of high and low sulphur content coals.

FINLAND

Already hard hit by an economic crisis in which its reserves of western currencies are depleted, Finland received an unpleasant jolt last month during negotiations with Poland and Rumania for fuels. Poland is Finland's chief coal supplier, Rumania supplies much of the country's oil. Both have asked for payment in western currencies. Poland is demanding sterling payment; details of Rumania's demand is unknown. The Poles have agreed to deliver 300,000 tons of coal to Finland that should have been delivered in 1956. An additional 1.1 million tons are also due, but 400,000 tons of this must be paid for in sterling. Another agreement demanded by Poland is a quarterly review of coal prices. Before this prices had been fixed for the year in advance. The latest increase pushes the per ton price from $20 and $20.4 to $27 and $28. Because of anxiety over depleted western currency reserves, further cuts in imports by Finland seem likely. Only recently the Finns chopped imports payable in western currencies by 5%.

HUNGARY

Miners from Hungary's Pecs district uranium mines have been "loaned" to the Pecs district coal mines, according to an announcement from Budapest. The move is part of the effort to repair heavy mine damage in the district, one of the centers of the armed October-November uprising. A small number of the uranium miners are being retained to clean up the damaged uranium area, but all

Bethlehem Roof Bolts, used with square plates and wire mesh, in metal mine.

You get increased safety with Roof Bolting

Mines become safer, with the danger of severe roof falls unlikely, when you install Bethlehem headed roof bolts. This is because the bolts anchor overlying strata into a thick, secure beam.

Bethlehem roof bolts have other advantages, too. Their use makes possible wider openings and clearances . . . full use of mechanized equipment at the face . . . good ventilation, due to the absence of bulky supports . . . and no fire hazard.

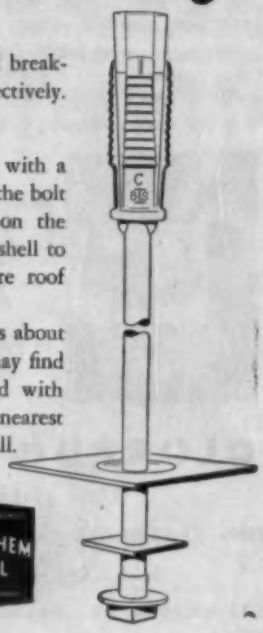
Four Types of Headed Bolt

The Bethlehem square-head roof bolt is manufactured in four types: a ¾-in. carbon-steel bolt and a ⅞-in. high-strength bolt, each of which has a typical breaking load of 24,000 lb; a ¾-in. and a ⅞-in. high-strength bolt, having typical breaking loads of 34,000 lb and 45,000 lb, respectively.

How Bolt Is Used

The Bethlehem headed roof bolt is used with a malleable-iron shell and steel plug. When the bolt is tightened, the plug is drawn down on the threads, expanding the four leaves of the shell to provide positive locking action. A square roof plate provides additional support.

We'll be glad to answer your questions about using the square-head roof bolt. Or you may find our 1-in. slotted roof bolt, which is used with a steel wedge, more to your liking. The nearest Bethlehem sales office is awaiting your call.



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Foreign News *(Continued)*

uranium mining activities have stopped. Shafts are reported flooded, surface installations dynamited so severely that a return to uranium mining will require an entirely fresh start rather than a mere resumption of work. Meanwhile, Hungary's coal miners have fled by the thousands. One estimate is that of 90,000 miners about 30,000 have reportedly fled to the west during the past 10 weeks.

FRANCE

Coal imports this year are expected to equal last year's record 23 million tons—instead of being drastically cut as the French had expected. Last year France was reconstituting stocks and bought heavily among world markets. With stocks finally up to a safe level the French had looked ahead to a normal level of imports. Now, the Suez-caused increase in coal is estimated to be 1.5 millions in the first half of 1957.

In shortest supply are coking coal and anthracite for home heating. Again, as in 1956 when it sold France more than 6 million metric tons, the United States will be one of the chief suppliers. (1955 tonnage: 800,000 tons)

Conversely, imports from western European countries, which were considerable in 1956 (West Germany, 6.7 million tons; Belgium-Luxembourg, 1.8 million; The Netherlands, 1 million; Great Britian, 780,000) are expected to fall off substantially. This, of course, will be the result of these countries, too, being hard hit by the oil shortage. In addition, French imports from the Saar, which amounted to 4½ million tons in 1956, will be reduced as a result of Saar integration with Germany this year.

In a search for other sources to make up for the import reductions of western Europe, the French government is negotiating with Russia and Poland. Under bilateral trade agreements now in effect between France and the two iron-curtain countries, the French received 600,000 tons of coal from Russia, and 1.2 million tons from Poland in 1956. The French, this year, would like to see a substantial amount of Donetz basin anthracite included in any new Franco-Soviet trade pact.

Discussions are also underway with Poland for a joint agreement under which France would exchange technical assistance and mining equipment for increased amounts of Polish coal. In addition to anthracite the French hope to get at least 1.5 million tons of Polish bituminous this year, although they realize that the political upheaval in Poland may stand in the way of increased Polish exports.

France's own coal production during 1956 was 57.4 million tons, the same as in 1955. A production goal of 59 million tons in 1956 had been planned, but couldn't be met when 5,000 miners were drafted for the Algerian war and not enough foreign miners could be recruited to make up the shortage.

Although stocks are considered "satis-

Neoprene-jacketed cable survives avalanche

The proven toughness and durability of neoprene make it ideal for conveyor belting

Thousands of tons of jagged rock crashed down and buried more than 500 feet of the shovel cable shown above. Giant rock fragments pinched and crushed it, but failed to cut the tough neoprene jacket. Power was uninterrupted. Your conveyor belt may never contend with an avalanche, but proven toughness and durability like this means your neoprene belt will stand up through years of service.

You'll like the way a neoprene belt takes mechanical abuse, and you'll find it handles coal just like an ordinary belt. Upgrade, coal has no greater tendency to slide. In cold weather, neoprene stiffens no more than natural rubber. Neoprene has about the same friction on a drive pulley—requires no more tension or power.

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You'll find neoprene belts are a profitable investment—reducing downtime for maintenance, offering longer service life and added safety. Next time you buy a belt, specify a neoprene cover. Your supplier can give you full details.

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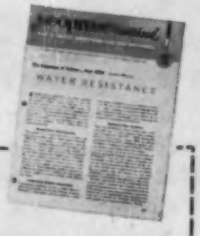

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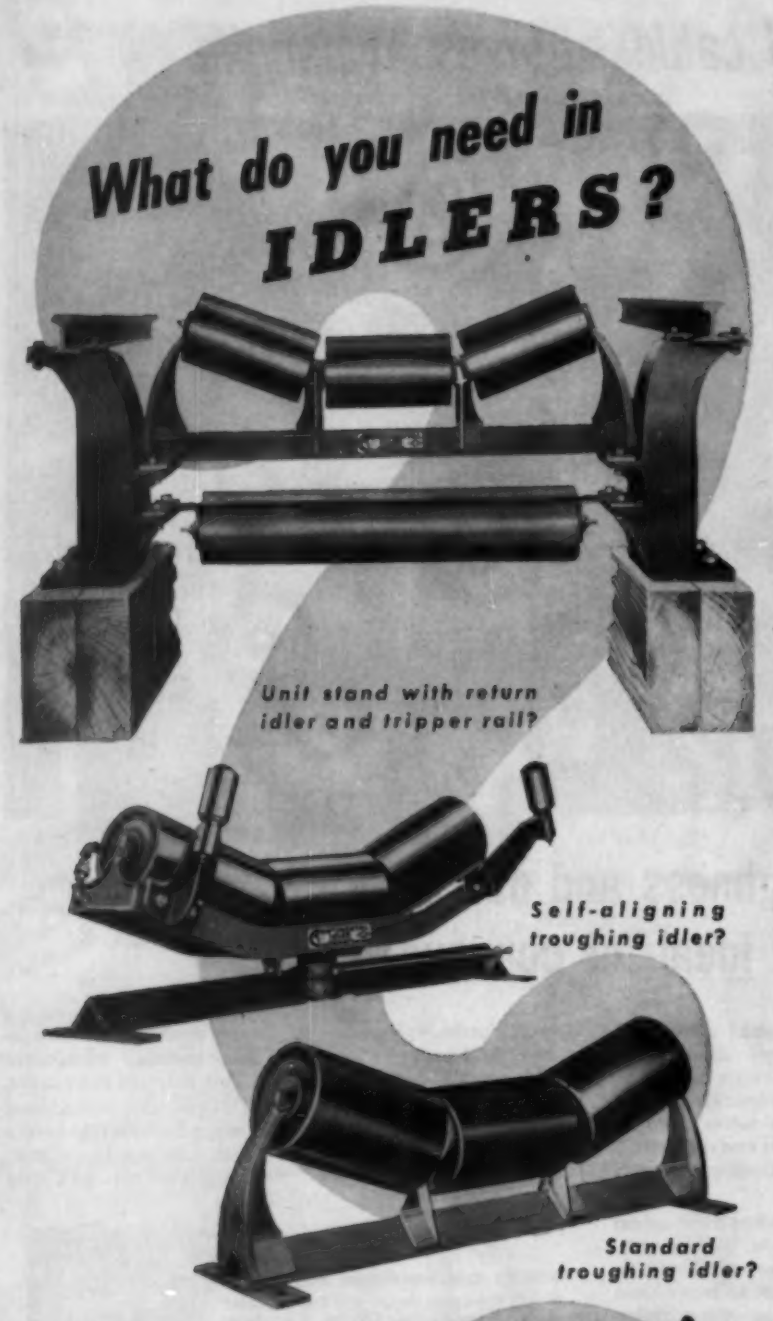

What do you need in
IDLERS?
Unit stand with return idler and tripper rail?
Self-aligning troughing idler?
Standard troughing idler?

Now shipping from stock in Birmingham — all conveyor accessories and standard units. Consult us on "specials" — see our nearest office.

CG-5702

Continental has them!

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA

CGC
ATLANTA CLEVELAND DALLAS KNOXVILLE
MEMPHIS MOBILE NEW YORK 17

Foreign News *(Continued)*

factory" any great increase in demand will be difficult to meet. Stocks of the government-owned electricity authority, Electricite de France, have dropped from a 3-month supply before the Suez invasion to 35 days. Another chief user, the nation's railroads, have stocks representing about one month's operation, which is about the pre-Suez level.

WEST GERMANY

West German coal production, based on preliminary calculations, rose to 134.4 million (metric) tons in 1956 compared to 130.73 million tons in 1955. Daily output during the year increased from 431,400 tons to 443,500 tons. Excluding brown coal mining the industry employed 489,000 workers in December, 1956, or 10,500 more than in Dec., 1955. Output per man per shift below ground averaged 1,564 kg, or 1.75 tons in 1956, compared to 1,544 kg, or 1.70 tons in 1955.

POLAND

Cautious optimism over Poland's economic plight has appeared among the Poles as a result of the latest coal production figures. The optimism turned up when it was announced late in January that the goal for coal production for the first three weeks in January had been exceeded by 22,231 tons, despite continuing difficulties at the mines. The higher production occurred during the recent election campaign, a fact that heartened the government considerably. Political stability, a necessary factor in overcoming Poland's economic troubles, has been promised by Wladyslaw Gomulka, first secretary of the communists. Last year's political upheaval was tied firmly to a deteriorating coal mining situation. Five million tons of export coal worth $100 million was lost and was at the root of the country's economic crisis. The next step was the recent political crisis.

The 5 million ton loss, it was feared by Secretary Gomulka, could occur again in 1957 unless productivity rose. Thus, if this occurred, the round of crises—low coal production, country-wide economic difficulties, and political difficulties—could repeat itself.

But the fulfillment in January of quotas was the first pay-off for wage increases recently granted miners and for bonuses promised for every extra ton of coal produced. However, the Poles are under no illusions that their own resources are sufficient to bring them the economic betterment on which their political stability depends. Thus, with the election out of the way, they are turning to Washington for indications of whether a loan will be coming their way. For the moment the Poles would be satisfied specifically with a loan tied to coal expansion. They are willing to guarantee a coal loan by allocating the increased production obtained with the new investment for repayment of the loan.

Here no motor can be too safe...

so Louis Allis Bureau of Mines permissible motors are used for lasting dependability

Nothing has been spared to give this Louis Allis Mine Type electric motor the utmost margin of safety. Special cartridge bearing construction assures long bearing life. And then there's the new research development of Louis Allis: special varnishes that afford maximum protective insulation against moisture.

They're built tough to take the physical punishment of coal mine service. Ample use of lock washers and wired bolting keeps all parts tight and in place — end bells are doubly secured by extra bolt fasteners. Every construction and design detail is engineered to match prevailing coal mine conditions.

For conveyors, cutters, pumps, fans — whatever your modernization program includes — consider this motor by Louis Allis—originator of the explosion-proof motor.

Write today for our file-sized DC Motor bulletin 1450. The Louis Allis Co., 441 E. Stewart St., Milwaukee 1, Wis.

LOUIS ALLIS

EP-103

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

More Uses — More

Versatility and mobility — the ability to do *many* jobs and the ability to get *to* any job quickly and easily are big reasons for the success and acceptance of rubber-tired tractor-shovels at pits and plants. Cleaner operations are also an important factor in favor of this rubber-tired equipment, as it doesn't chew up the ground and travel surfaces or raise dust like crawler tracks. And among rubber-tired tractor-shovels, none can match the versatility, mobility and productive capacity of the three new 4-wheel-drive "PAYLOADER" models, size for size. Operators of both underground and open pit mines, as well as of cleaning plants and tipples, praise their effectiveness for loading cars and trucks . . . charging hoppers and feeding conveyors . . . handling tailings . . . clean-up around power shovels . . . maintaining haul roads . . . stockpiling . . . spotting railroad cars and general drawbar work. They like the more reliable traction . . . easier, faster and safer operation . . . increased digging power . . . greater carrying capacity . . . and other outstanding improvements found in these new models.

Your "PAYLOADER" Distributor wants you to prove on your own work that these new "PAYLOADER" units are the most useful, productive and profitable tractor-shovels you can own.

Feeding Tipples

Spotting Cars

Output — More Profit

Full of "More-Yardage" Features

Exclusive power-transfer differentials provide sure-footed traction on mud, gravel, ice and snow.

Hydraulic load-shock absorber cushions the loaded bucket, smooths the ride — permits higher carry speeds with less spillage.

No-stop power-shift transmissions can make ALL shifts on-the-go, under full engine speed. No stopping for RANGE SHIFTS . . . no "clutching".

Powerful 40° bucket pry-out, break-out action — Rugged planetary final drives — Power steering — 4-wheel power brakes.

Owners expect more from a "PAYLOADER" and they get more, because more of them are in service than all other makes combined. They're designed right and built right . . . they're sold and serviced right by a nearby "PAYLOADER" Distributor.

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
735 Sunnyside Ave., Libertyville, Ill.

Send data on 4-wheel-drive "PAYLOADER" tractor-shovels as checked

- ☐ HO (2¼ yd. payload, 1¾ yd. struck)
- ☐ HH (1¾ yd. payload, 1½ yd. struck)
- ☐ HU (1½ yd. payload, 1 yd. struck)

Name _____

Title _____

Company _____

Street _____

City _____

State _____

39

This is

ANOTHER BIG YEAR

FOR WEDGE-WIRE Kleenslot SCREENS

● By leaps and bounds during the past years Wedge Wire Screens have been growing in popularity and to all appearances our output in the market for our product will be greater than ever before. Wedge Wire KLEENSLOT Screens are precision made on a non-blinding, non-clogging principle and can be furnished in practically any type metal including aluminum to absolute positiveness of dimension in opening. Prompt estimates are gladly furnished by our Engineering Department. Write today, don't delay!

Wedge-Wire CORPORATION
Gas Street at Nickle Plate R. R.
Wellington, Ohio

Personal Notes

William D. Hamilton, former general manager of coal mines for Oglebay, Norton & Co., was recently elected vice president in charge of coal operations. Mr. Hamilton joined Oglebay, Norton in 1936. In 1939 he was transferred from the iron ore and alloy sales division to coal sales and preparation. In 1942 he moved to coal sales and production. Six years later, in 1948, he was promoted to general manager.

The Black Star Coal Corp. has disclosed the appointment of **R. F. Phipps** as vice president in charge of production. The company says that Mr. Phipps will be concerned primarily with the Black Star mine at Alva, Ky., but that his headquarters will be at the corporation's general office in Louisville, Ky.

Harold W. Cooper, former education instructor in Logan and Fayette Counties, W. Va., has been appointed employee relations supervisor at Tralee mine, Semet-Solvay Div., Allied Chemical & Dye Corp., Tralee, W. Va. Before joining Semet-Solvay Mr. Cooper had been safety and service engineer for the company's Ashland plant.

E. B. Leisenring Jr. has been elected vice president of Stonega Coke & Coal Co., Philadelphia, Pa. In addition, Mr. Leisenring also has been named vice president of The Virginia Coal & Iron Co., Westmoreland, Inc., and Westmoreland Coal Co.

Peter Wilson, former section foreman at Colver, Pa., mine, Eastern Gas & Fuel Associates, has resigned to take a post as superintendent with the Pennsylvania Coal & Coke Co., Ehrenfeld, Pa.

R. S. Graham, Norton, W. Va., coal executive, retired in December. Mr. Graham was president of the Wise Coal & Coke Co., the Kemmerer Gem Coal Co., and vice president of the New York Mining & Mfg. Co. For 50 yr he had represented the Kemmerer interests in Virginia. One of the organizers of the Virginia Coal Operators Association, he served that organization several times as president and member of the board.

Bernard Moser has resigned the Wilferd L. Roller Co. for private practice. The Roller organization, consulting metallurgical engineers of Charleston, W. Va., specializes in metallurgical plant design and in heavy density and oil-flotation processes.

William S. Landers, Denver, Colo., has been appointed chief of the Branch of Coal Technology for Region III, the U. S. Bureau of Mines has announced. An assistant branch chief since 1951 and a career scientist with the USBM since 1938, Mr. Landers succeeds the late **V. E. Parry.** Mr. Parry, well known in industry and government for his work in research and process development in coal technology, died Dec. 16. Mr. Landers joined the USBM in 1938 as a chemical engineer in the Coal Div. He has, since, specialized in solid fuels. For a number of years he had been assigned to the Central Experiment Station in Pittsburgh, Pa., for studies of coke, packaged fuel, and the combustion and gasification of coal. In

COAL MEN ON THE JOB . . .
OLD BEN COAL CORP.—No. 9 mine, West Frankfort, Ill. John Sharknas (left), mine manager; Horace Little, assistant chief electrician; and Frank Eubanks, maintenance superintendent, all mines, discuss problems at No. 9 underground shop.

Coal's bright future—a prospective output of 600 million tons by 1960—calls for larger haulage ways in many mines.

Here we see a Le Roi-Cleveland airleg and drill enlarging a haulage way.

This airleg unit makes drilling much easier for miners because it supports the machine and feeds it into the rock at the same time. Eleven feed positions provide the proper feeding action for the material being drilled.

How Air Tools Help Coal Mines to Increase Their Haulage Capacity

by Le Roi-Cleveland

Taking up bottom on a production basis. The Le Roi-Cleveland Model DR34 Light Wagon Drill is ideal for this type of work. It has the mobility — is easy to move around. It has the flexibility — drills toe holes or flat holes 7½ feet above ground level, with all adjustments being made by air motor. It permits the use of more powerful drills for faster drilling and deeper holes.

A simple way to take up bottom. When you have only a few holes to drill, a Le Roi-Cleveland H10 riding a plank provides a practical method of drilling toe holes. The machine you see here was detached from its airleg. Its cylinder contour is such that it rides a plank perfectly. When this job is over, the drill can be attached to its airleg in a few seconds and is then ready for other drilling jobs.

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

Keeping coal
ON THE GO
down below!
COLLYER
Twin Parallel Type G
P-107 BM COLLYER
Over rough surfaces . . . around cable-killing corners . . . day after day, month after month, you can count on Collyer Twin G Cable to keep your coal-moving equipment powered for production. Specially designed and constructed for shuttle cars and loaders, this tough, extremely flexible cable provides maximum protection against cutting, scraping, twisting and crushing. Its dense, lead molded neoprene jacket resists heat, moisture, oils, chemicals, sunlight and flames . . . assures long, trouble-free service under most difficult operating conditions. Prove it for yourself. Write for samples, prices and specifications today.
COLLYER INSULATED WIRE COMPANY
245 Roosevelt Avenue, Pawtucket, R. I.
Collyer
COAL AGE
FOR MORE DATA CHECK OUR ADV'T PAGE 210
LIVE BETTER ELECTRICALLY

Personal Notes *(Continued)*

his new post he will be responsible for planning, supervising, and conducting research on the properties and utilization of western coals and those of foreign countries.

John H. Melvin, state geologist, Ohio state geologist since 1947, has been elected vice president, operations, of the Pennsylvania Drilling Co., Pittsburgh, Pa.

C. Austin Cross, U. S. Steel Mines, Lynch, Ky., has been elected president of the Harlan Mining Institute for 1957.

Obituaries

B. P. (Bert) Manley, executive secretary of the Utah Coal Operators Association since 1932, died Jan. 8 after a brief illness. Mr. Manley was 75. An Englishman who worked as a Mississippi River deck hand and as a cowboy before becoming a coal miner in 1901, Mr. Manley was a mine official and operator in Oklahoma, Colorado, Utah and Wyoming. In Oklahoma he worked as a mine foreman, then assistant superintendent until he moved to Colorado as superintendent. By 1908 he had advanced to general inspector of the 40 mines operated by the Colorado Fuel & Iron Corp. He moved to Utah in 1913 as head of a testing crew for the Utah Fuel Co., then in 1915, went to Kemmerer, Utah, as general manager and acting sales agent for Keystone Coal Co. He returned to Utah as general manager of the Wattis Coal Co., which later became the Lion Coal Corp., Wattis, Utah. From 1922 until 1931 he was associated with the Kinney Coal Co. mine at Scofield, Utah, then with the Carbon Fuel Co.

Harold M. Smyth, president of the St. Clair Coal Co., St. Clair, Pa., died Dec. 19 after a heart attack. Mr. Smyth was 65.

John V. Berry, safety director of Bethlehem Mines Corp., died Jan. 6 at his home in Johnstown, Pa. Mr. Berry moved to Johnstown in 1923 from Williamstown, Pa. Prior to that he had served the U. S. Bureau of Mines for 10 yr as a member of the rescue committee for coal and metal mines.

MEETINGS

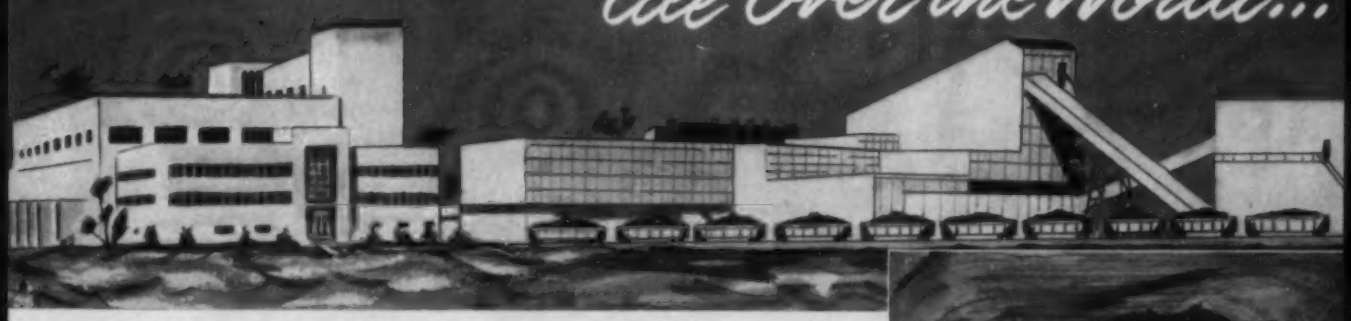
AIME, Annual Meeting, Feb. 25-27, Roosevelt and Jung Hotels, New Orleans, La.

Bituminous Coal Research, Inc., April 18, 19, Greenbrier Hotel, White Sulphur Springs, W. Va.

2nd Annual Appalachian Underground Corrosion Short Course, June 4-6, West Virginia University, Morgantown, W. Va.

National Coal Association, Annual Convention, June 4-6, Hotel Shoreham, Washington, D.C.

Modern Mechanized Mines All Over the World...



Interior illustration of highly mechanized operation where Continuous Miners and Cincinnati Chains and Bits are a "Must"!

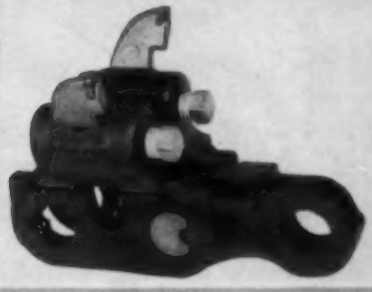
BREAK PRODUCTION RECORDS WITH

CINCINNATI'S* COMPLETE

LINE OF CHAINS AND BITS FOR EVERY TYPE OF CONTINUOUS MINING MACHINE

TYPE-1854 . . . used on Joy Continuous Mining Machines where flanges are required . . . either the 5 chain Ripper Head or the 2 chain Rotary Head.

STANDARD KERF TRIMMING CHAIN . . . for use on boring type Continuous Miner.



TYPE-1854-WF . . . used on Joy Continuous Mining Machines where flanges are NOT required . . . either the 5 chain Ripper Head or the 2 chain Rotary Head.

Always looking ahead, CINCINNATI MINE not only offers a complete line of chains and bits for every type of CONTINUOUS MINING MACHINE in use but has designed chains and bits for new machines now in the development and testing stage. Keeping ahead of the field is nothing new to the men at CINCINNATI MINE who have devoted the greater part of their lifetime to specializing in the design and manufacture of the BEST IN CHAINS AND BITS for every type of machine and for every individual cutting problem. Our leadership is not only the result of our own HIGHLY SKILLED PERSONNEL but also due to the fine cooperation our research staff and field men have had from our many friends in the industry. If at any time you have a cutting problem, we welcome the opportunity to be of assistance.

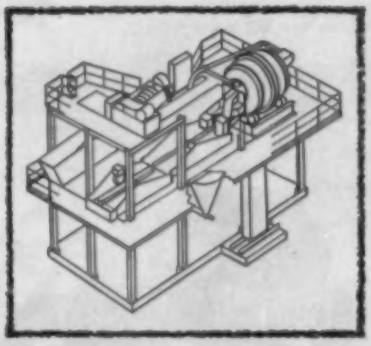
the

CINCINNATI*

MINE MACHINERY CO.

CINCINNATI 25, OHIO

preferred



WEMCO

MOBIL-MILLS

are the most widely preferred HMS plants because they provide *proven design at predetermined cost — trouble-free operation from the first day.*

WEMCO
WESTERN MACHINERY COMPANY

650 Fifth St., San Francisco 7, Calif.

Offices and representatives
in principal cities
of the United States and Canada
and in major countries
throughout the world.

Among the Manufacturers

This was the news:

Caterpillar Tractor Co., Peoria, Ill., disclosed plans to build an industrial engine plant, a research center and a general office building 12 miles north of Peoria. Site preparation for the industrial engine plant is scheduled to begin in the next few months. Construction dates of the research center and general office building await engineering work. Caterpillar estimates that the total cost of the three-unit project will be more than $200 million in the next 3 yr. It expects to employ 3,500 persons, of which 1,200 will work in the industrial engine plant. The several buildings planned for the research center will be constructed in progressive stages. The engine plant will manufacture Caterpillar V-type engines ranging up to 650 maximum horsepower. All other engines will be made at the Peoria plant. H. S. Eberhard, president of Caterpillar said in the company's announcement that the company's manufacturing facilities situated on the present site will be expanded when the general offices are moved to the new area.

R. W. Hopewell was appointed manager of field engineering for the Industrial Div., Gould-National Batteries, Trenton, N. J. In his new position, Mr. Hopewell, who previously served as manager of field service, will evaluate battery and charging equipment requirements as well as establish maintenance procedures.

Dorr-Oliver, Inc., Stamford, Conn., appointed Shutt Process Equipment Corp., St. Louis 10, Mo., a distributor of industrial and process pumps. Shutt will supply the D-O pump line throughout southern Illinois, eastern Missouri and western Kentucky.

Ohio Brass appointed R. G. Manis district manager in southern West Virginia to work with Charleston Electrical Supply Co., long an Ohio Brass distributor in the area. William C. Preston will take over Mr. Manis' former duties as district manager in eastern Kentucky.

Chain Belt Co., Milwaukee, Wis., created three regional sales managers for the eastern, midwest and southern, and northwestern sales regions. J. B. Roberts, formerly New York district sales manager, was made eastern regional sales manager; William Sivyer, formerly Philadelphia district sales manager, became midwest and southern regional sales manager; and H. F. Bergis, formerly Portland district sales manager, became northwestern regional sales manager.

Jeffrey Mfg. Co., Columbus, Ohio, appointed Carl G. Schilbe district manager of the Salt Lake City territory in charge of sales for both industrial and mining products.

John Lang, general sales manager of the Ruberoid Co. announced that Jerome Simon, Willowick, Ohio, had been assigned the company's sales territory in southwest Ohio. For several years Mr. Simon had served customers in the Cleveland area.

Jeffrey Mfg. Co., Columbus, Ohio, appointed A. Howard Smith, Rochester, N. Y., manager of commercial research. Before joining Jeffrey Mr. Smith had directed business research departments for Robbins & Myers, Inc., and Bausch & Lomb Optical Co.

The Jeffrey Mfg. Co., Columbus, Ohio, appointed Russell W. Knode general manager of sales, Mining Div. Before the appointment Mr. Knode had been manager of field offices, Mining Div. He succeeds A. R. Anderson, who retired Dec. 31 after 35 yr with Jeffrey. Mr. Knode has been with Jeffrey 21 yr.

Raybestos-Manhattan, Inc., Passaic, N.J., disclosed an extensive reorganization was under way in the field sales structure of its Manhattan Rubber & Packing Div. By expanding its field sales force and dividing the country into four sales regions, each headed by a regional manager, Raybestos-Manhattan expects

HINGED PLATEGRIP
BELT FASTENER No. 500

FOR HEAVY CONVEYOR BELTS OF CHANGING LENGTH

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from 3/8" to 1/2" thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed or added at will. Joints are opened for this purpose by simply pulling out the hinge pin.

Easily and quickly applied on the job or in the shop. Special design gives deep compression into belting and smooth, flush joint.

Write for Circular

ARMSTRONG-BRAY & CO.
5340 Northwest Highway CHICAGO 30, U. S. A.

STRIP AND RECLAIM ECONOMICALLY *with help like this . . .*

- **MOST POWER PER YARD . . . most power per pound in its class**
- **MOVES FULL LOADS AT FULL SPEED**
- **WIDE OVERLAP IN GEAR RANGES…for easy shifting, smooth acceleration**
- **CURVED BOWL BOTTOM . . . offset cutting edge . . . for fast, full loading**
- **HIGH APRON LIFT . . . positive, clean ejection**

This is the Allis-Chalmers TS-360 . . . a motor scraper that has proved it can strip overburden profitably . . . and reclaim worked-out areas in the same operation. As demands for greater efficiency increase, be ready with the best . . . an Allis-Chalmers TS-360. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS *Engineering in Action*

Manufacturers (*Continued*)

to be able to serve expanding markets and introduce new products. With the expansion disclosure last month these personnel shifts were also announced: R. F. Teeling, eastern regional manager; F. McBrearity, Philadelphia district manager; A. L. Hawk, central regional manager; A. N. Johnston Jr., Pittsburgh district manager; G. S. Himebaugh, Chicago district manager; E. T. Fair, Denver district manager; C. P. Shook Jr., southern regional manager; A. A. Ringland, Birmingham district manager.

Thomas Robins Jr., president of Hewitt-Robins, Inc., Stamford, Conn., announced the election of vice presidents F. L. Griffith and F. W. Blanchard. Mr. Blanchard will be responsible for manufacturing and engineering in the company's industrial products divisions. Prior to the election he had been assistant to executive vice president Austin Goodyear and, before that, manager of operations at the Hewitt Rubber Div., Buffalo, N.Y. Mr. Griffith had been general sales manager of the industrial products divisions since 1953. He will continue in that capacity as a vice president.

Duff-Norton Co., Pittsburgh, Pa., promoted T. W. Krueger, an assistant sales manager, to sales manager of the company's Jack Div. Mr. Krueger will be in charge of all railroad, industrial and export jack sales.

In Galion, Ohio, Hercules Galion Products, Inc., appointed D. J. Redmond director of sales. In the post Mr. Redmond will be responsible for sales activities of the corporation's Hercules Steel Products Co., Galion Allsteel Body Co., Unisteel Body Co., and Hydro E-Z Pack Co., all divisions of Hercules Galion.

Andrew M. Kelly, manager of the customer relations department for Coffing Hoist Div., Duff-Norton Co., Pittsburgh, was promoted to product manager of the division.

Robert H. Gettemy was appointed field representative, mining tool division, Firth Sterling, Pittsburgh, Pa. Mr. Gettemy will cover the areas of southern West Virginia, eastern Kentucky, eastern Tennessee and Alabama. A former extension course instructor in coal mining engineering at Penn State College, Mr. Gettemy was also employed (11 yr) as a foreman in Republic Steel's Banning No. 1 and No. 2 mines. His headquarters for Firth Sterling will be Charleston, W. Va.

Stockholders of the Pangborn Corp., Hagerstown, Md., elected Victor F. Stine president, effective Jan. 1. The company manufactures blast cleaning and dust controlling equipment. Mr. Stine joined Pangborn 45 yr ago as a bookkeeper, progressed through diversified activities until in 1935 he was appointed a second vice president and sales manager. Concurrent with Mr. Stine's election, Ralph M. Trent was named director and executive vice president; W. O. Vedder, vice president. Thomas W. Pangborn, founder and president of the corporation since 1904 will continue to serve as chairman of the board.

Parkersburg-Aetna Corp., Parkersburg, W. Va., established the Metal Building Div. of the Parkersburg Rig & Reel Co. Div. Pre-engineered metal buildings, long a product of the Rig & Reel Co., will be made by the new division. Parkersburg has established the division with its own sales, engineering and manufacturing facilities under the direction of general manager Corbie L. Wilson. Metal Buildings is the third segment of the company product lines to operate as a division. A new series of metal buildings will be introduced this year. Parkersburg says the units will have a radically different design.

Emmett H. Mann was named vice president and general manager of the Leschen Wire Rope Div., H. K. Porter Co., Inc. Until the new appointment Mr. Mann held a similar post with the Allov Metal Wire Div.

Raymond R. Dirksen, sales engineer, was promoted to assistant sales manager of the Dynamatic Div., Eaton Mfg. Co. Mr. Dirksen joined the division in 1951.

. . . A special form of Carbon ideally suited for industrial explosives is used in AKREMITE, new blasting medium developed and patented by the Maumee Collieries Co.
M-1 BLACK

AKREMITE *prepared with* M-1 BLACK

assures efficient, safe and economical results in strip mining. Millions of pounds have been shot to date without misfire or accident.

For perfect AKREMITE results, M-1 BLACK *is the carbon to use.*

Samples and Technical Data Furnished on Request to Licensees

R. T. Vanderbilt Co., INC. 230 Park Avenue • New York 17, N. Y.

CARL: "A new flocculant doesn't interest me. I've been using the same one for 17 years."

FRED: "Is that so? I'm always looking for something better, Carl. That's why I tried Separan 2610."

Which is your reaction to the revolutionary flocculant, Separan 2610?

Let's listen in on a conversation between these two veteran coal processors: "I don't see why you're so resistant to change, Carl. The way I figure it, we've got to keep an open mind to improvements . . . like trying this new flocculant, Separan 2610®."

"Horsefeathers, Fred, I wouldn't go to the trouble."

"Trouble! You could hardly call it that, Carl. Think of the results! I'm using only 0.06 pound per ton of fines in my thickener. And the overhead is better than I've had in years. It's just a matter of using Separan properly."

"Properly?"

"Well sure, Carl. You wouldn't drive a car like a horse and buggy. By using Separan the right way I've upped settling speed and get better dewatering on the overflow. The best part, of course, is that the overflow solids have been reduced."

"Mighty interesting. But . . ."

"But, but, but. No buts, Carl. Even if you have used the same flocculant for 17 years, you owe it to yourself and your company to try Separan."

NOTE: Separan 2610 is truly a revolutionary flocculant that, today, promises coal processors a future of vastly speeded-up settling and filtration. A sample and technical assistance can be obtained by writing THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. SC 1319F.

YOU CAN DEPEND ON DOW

Aeroquip Hose Lines are used for fuel and high pressure hydraulic applications on this rock and earth drill.

"Aeroquip Hose Lines are Trouble-Free Even Under Adverse Working Conditions"

Highly flexible Aeroquip Hose installs easily, withstands vibration and shock on this auger engine.

Says S. Corte, Owner
Corte Construction Co.,
Kimble, West Virginia

In this West Virginia strip mining operation, Aeroquip Flexible Hose Lines help keep two McCarthy augers working up to 20 hours a day, 225 days a year. Although the Aeroquip Hose Lines on these augers are punished by weather, extreme vibration, jarring and rough handling, Mr. Corte reports: "No hose line trouble."

Corte Construction Co. uses Aeroquip Hose Lines for many applications on a variety of heavy equipment: 1525 Hose for engine fuel lines and air lines; 1509 Hose for high pressure hydraulic cylinder lines; 1503 Hose for hydraulic jacks, control valves, power steering lines and oil and grease lines.

All Aeroquip Hose types have reusable fittings which permit quick hose line replacement in the field, when necessary. Your Aeroquip Distributor can give you complete information. He's listed in your Yellow Page Phone Directory, or write us.

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

IN CANADA: AEROQUIP (CANADA) LTD., TORONTO 10, ONTARIO
LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U. S. A. AND ABROAD
AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

News Roundup (from p 148)

for engineering work from the 1957 state legislature. This may be difficult, since some Democratic members of the Democratic-controlled legislature are in favor of dissolving the commission.

J. P. Routh, Pittston Co. board chairman, predicts that coal production should be somewhere between 800 million and 1 billion tons by 1975.

Mr. Routh made the forecast during an address before the New York Security Analysts. Despite continued competition from oil and natural gas, "and perhaps nuclear reactors," coal will prosper by meeting "such competition through startling developments in automation," Mr. Routh declared. He pointed out that American output has risen from 7 to 11 tons per man per day during the past 5 yr, compared to a European production figure of less than 1½ tons per man day. Pittston, itself, he said has installed machinery that is "averaging approximately 45 tons per man per shift. Mr. Routh also forecasts a major shrinkage in the number of producers by the mid-1970's. "I feel," he said, "that over the next 20 yr there will emerge from the some 5 to 6 thousand coal producers today perhaps 10 to 20 strong companies producing the major portion of bituminous coal." Mr. Routh's own company, Pittston, receives about 60% of its earnings from coal mines, and owns the Clinchfield Coal Co. Pittston will pay shareholders about $6 a share this year, according to Mr. Routh. Last year earnings per share were $3.06.

Operators and labor in Pennsylvania have thrown a joint block at a federal recommendation to permit natural gas in the Scranton and Wilkes-Barre areas.

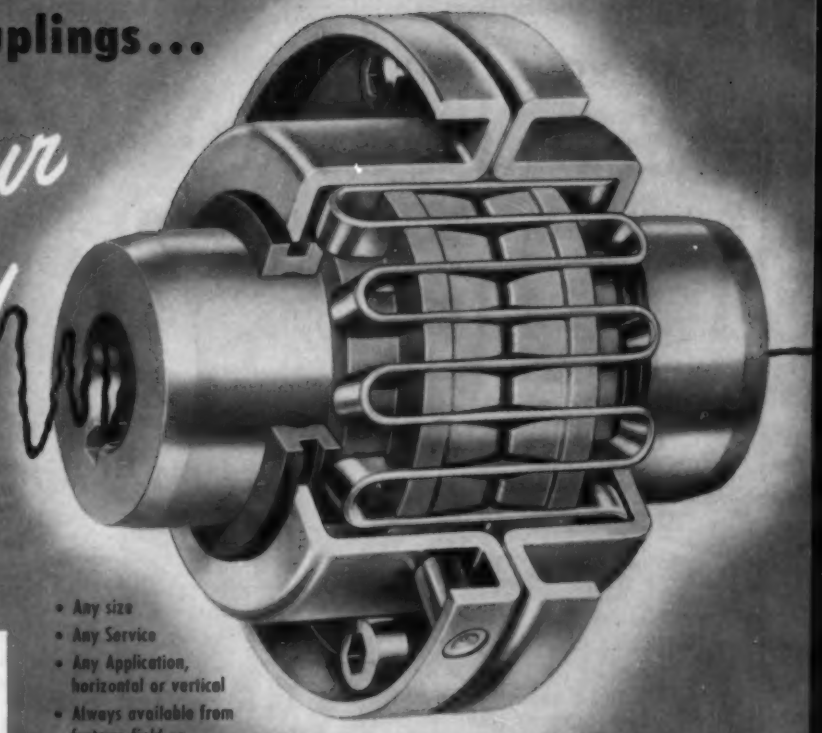
Reacting to a Federal Power Commission examiner's approval of a move to introduce natural gas into the Scranton and Wilkes-Barre divisions of the Scranton-Spring Brook Water Service, the Anthracite Institute, the UMWA and Fuels Research, Inc., have filed 16 specific exceptions to the recommendation. Prior to the filing eight anthracite originating railroads had filed five exceptions to the same recommendation. The next move is up to the FPC. When it makes its decision either side will be permitted 30 days in which to file applications for reopening and rehearing.

Rep. Harley O. Staggers (D., W. Va.) charges that the lack of a federal conservation program for natural gas has lowered the life index of the fuel from 31 to 22 yr.

Charging the government with a "grave dereliction," Rep. Staggers is advocating revision of the natural gas act to assure "future generations" of an adequate supply. He urges "updating" the act to improve so-called "obsolete" rules of procedure under which the Federal Power Commission operates. Rep. Staggers notes that both the President's Materials Policy Commission and the White House Report on Energy Supplies and

Falk Steelflex Couplings...

Protect your machinery in 2 ways



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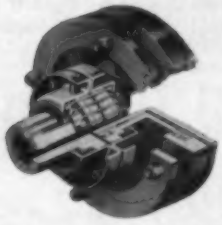
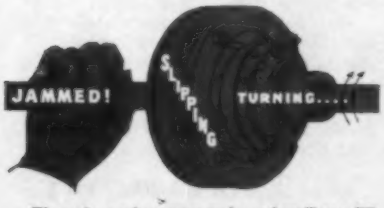


Falk Controlled Torque Couplings prevent damage from overloads

In applications where danger from overloads exists, use the FALK Type FT Controlled Torque Coupling. The Type FT has all the features and advantages of standard FALK Steelflex couplings—and, in addition, has an adjustable friction slip clutch, enabling the operator to set the coupling to slip at any predetermined overload.

This controlled-torque principle not only prevents transmission of dangerous shocks and limits overloads; it eliminates the breaking of shafts caused by jamming of driven equipment.

An outstanding advantage of the Type FT Coupling is that, as soon as the cause of the overload is removed, the entire coupling will rotate and transmit power without replacing parts or repairing coupling.



There's real economy in using Type FT Controlled Torque Couplings. Many users have reported that these couplings paid for themselves the very first time they slipped (under overload) because of the protection against damaged driving or driven machinery!

...cost less per year of service!

You get *double protection* when you connect your driving and driven machinery with a Falk Steelflex Coupling—the all-steel coupling with the exclusive grid-groove design! First, *its torsional resilience* smothers shock and vibration; and second, the Steelflex design prevents damage and lowered efficiency by accommodating shaft misalignment.

Why have increasing numbers of key men in industry standardized on Falk Steelflex Couplings? Their experience has proved that Falk Steelflex Couplings prolong the service life of their machinery... are trouble-free and need minimum maintenance... are easy to install, lubricate and disconnect... and *cost less per year of service* than ordinary couplings.

One basic Steelflex design—the type F, in its many sizes—is adaptable to more than 90% of all industrial applications. For applications involving danger from overloads, Modified Type FT Controlled Torque couplings (see column at left) are ideally suited. There are numerous other special or dual purpose Steelflex couplings for unusual applications. **Write to Department 247** for engineering bulletin, including selection and dimension tables.

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

FALK

...a good name in industry

MANUFACTURERS OF:

- Motoreducers
- Speed Reducers
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- Shaft Mounted Drives
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- Special Gear Drives
- Single Helical Gears
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- Marine Drives
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- Weldments
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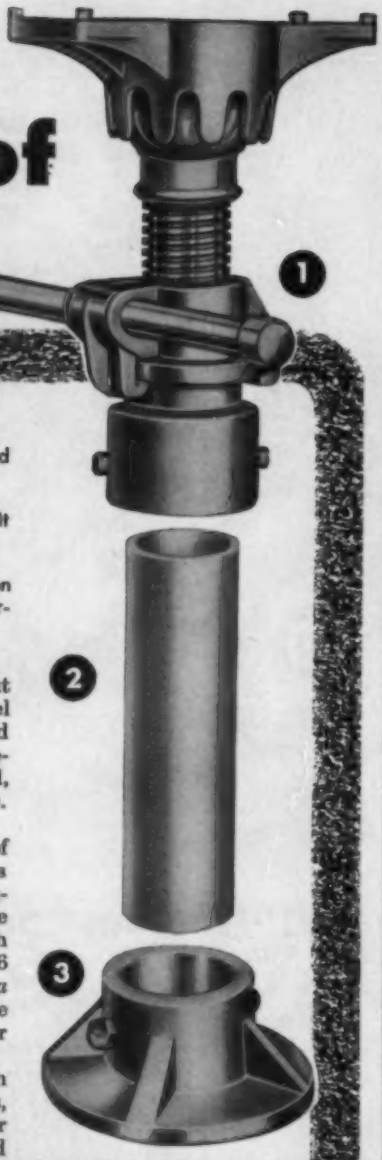
how to make your own

mine roof jacks



1. Duff-Norton supplies the head and handle.
2. You supply the pipe to fit your desired height.
3. Add the desired Duff-Norton base and you have the perfect mine roof jack.

Here's all you do—(1) cut any 2-inch standard steel pipe into lengths desired and (2) attach safe, strong, dependable Duff-Norton head, handle and base fittings. That's all!

You choose the type of heads, handles and bases best suited to your particular needs. They are available in a variety of types in both 8 and 16-ton capacities (16 ton requires 2-inch *extra strength* pipe). All fittings are painted light grey for better visibility.

For complete information on Duff-Norton mine jacks, see your local distributor or write the world's oldest and largest manufacturer of lifting jacks for your free copy of catalog AD-10J, "A Handy Guide for Selecting Duff-Norton Mine Jacks." This catalog contains complete information not only on mine roof jacks but other popular Duff-Norton jacks for useful trouble-free service in and around coal mines.

Duff-Norton Jacks

DUFF-NORTON COMPANY

P. O. Box 1889 • Pittsburgh 30, Pennsylvania

COFFING HOIST DIVISION: Danville, Illinois

Rachet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks, Rachet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists

News Roundup *(Continued)*

Resources Policy have recommended substantial changes in the Natural Gas Act. These are the suggestions he has made to Congress to accomplish the changes: 1) a sound national conservation policy 2) FPC jurisdiction over industrial sales of natural gas in interstate commerce 3) prohibition of gas dump sales at below cost-of-production prices while domestic consumers are charged full rates 4) application of the same rules of interstate commerce for imported natural gas as those applied to American suppliers.

An expensive experiment to eliminate mine drainage acids is being undertaken by the Christopher Coal Co., Pitt Consol subsidiary.

The experiment will be conducted at a new Greene County, Pa., mine near Mt. Morris, which is scheduled to open in mid-1957. Following a method developed at the Mellon Institute by Dr. S. A. Braley, the operators will drill a deep bore hole and install a series of lift pumps and tubing to discharge mine water before it comes into contact with air and acid-bearing materials. If successful the Braley "deep sump" method may be the pilot for eliminating acid drainage at other deep mines.

Pennsylvania Coal & Coke Corp., Cresson, Pa., has bought the Heshbon Coal Co., Heshbon, Pa.

For an undisclosed sum Pennsylvania Coal & Coke, a subsidiary of the Penn-Texas Corp., gets the mine at Heshbon, Pa., and all the assets of the company, including mineral rights and surface land. The mine was scheduled for reopening after Jan. 1, and plans call for marketing 1,000 tpd.

The Branch Fuel Co., Laurel Creek, W. Va., plans to open a 1,000-tpd mine near Thayer, W. Va., in the Fire Creek coal seam.

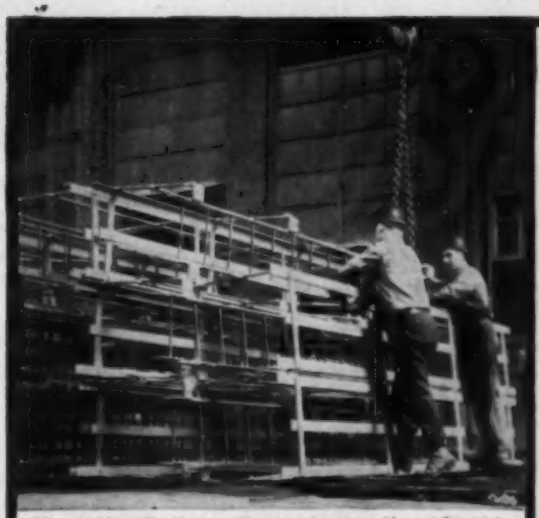
Construction work on a tipple and head house is scheduled to begin in the next few weeks. The company says approximately 100 to 120 miners will be employed during full production. Branch Fuel holds a lease on some 3 million tons of coal on the site.

The Norfolk & Western Railway loaded 1,021,127 coal cars of 50-ton equivalent during 1956.

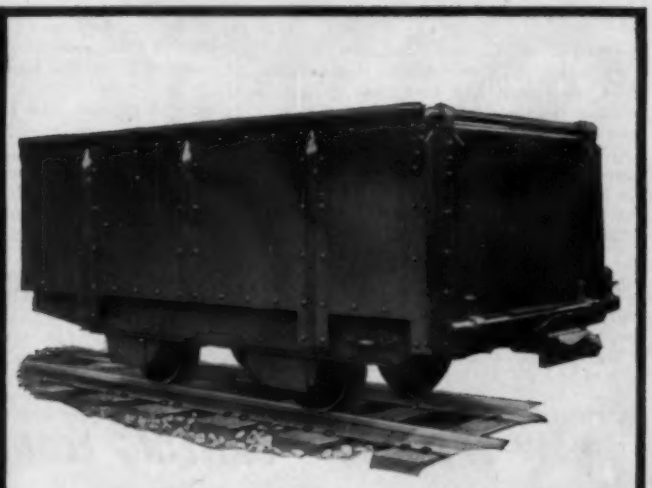
The figure was approximately 10% more than the 1955 level of 925,851 cars. The railroad gives three reasons for the higher loadings: increased overseas shipments; domestic demand from generating plants; and an increase of steel making.

Inland Steel Co. is building 174 Koppers-Becker combination coke ovens at its Indiana Harbor works in East Chicago, Ind.

Koppers Co., Inc, will erect the ovens

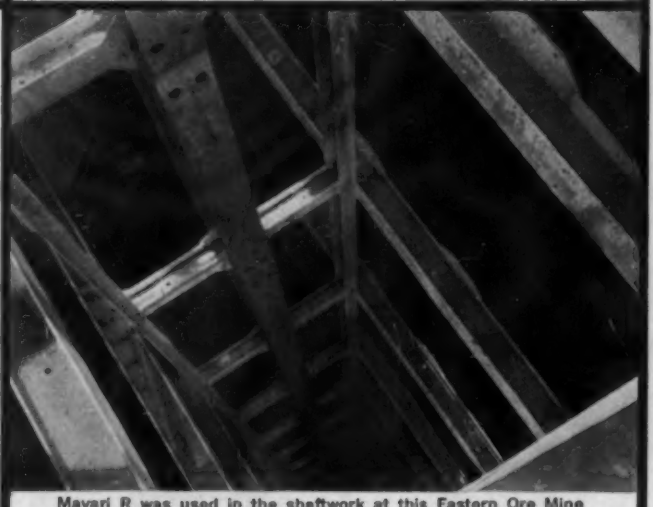


Mine ladders like these utilize to advantage Mayari R's high strength and resistance to corrosion.



Thousands of modern mine cars are being made lighter, stronger, longer-lasting because they are built of Mayari R.

HOW MINES BENEFIT BY USING VERSATILE Mayari-R



Mayari R was used in the shaftwork at this Eastern Ore Mine because of its superior ability to resist corrosion.

Mayari R high-strength, low-alloy steel has a substantially higher yield point than structural carbon steel. This means that a much stronger structure can be built without adding needless weight or bulk; or weight can be reduced without sacrificing a given strength requirement.

Mayari R resists atmospheric corrosion far better than carbon steel. And it offers greater resistance to abrasion, battering and piercing—an especially valuable feature in the construction of modern, heavy-duty mine cars.

In the shop, Mayari R can be welded just about as readily as carbon steel, with the same general techniques. It can also be flame-cut, machined, formed and otherwise worked in generally the same manner as plain carbon steel. It has good impact qualities and holds paint exceptionally well.

In addition to mine cars, Mayari R is being widely used in such mine applications as ladders, chutes, buckets, conveyors, skips and cages, stairs, hoppers and gratings. Catalog 353 contains a vast amount of technical and illustrative material that should be interesting to anyone connected with mine construction or operation. If you would like to receive a copy please address the Bethlehem district sales office nearest you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

News Roundup (*Continued*)

in batteries of 87 each. The new batteries will replace two existing batteries of 74 ovens each. The ovens will be the gas gun type and will be designed for coke oven gas and future blast furnace gas underfiring. Upon completion the batteries will raise the total number at the Indiana Harbor No. 2 coke plant to 385. Each new battery will carbonize 1,870 net tons of coal per day.

The Cherry Hill Coal Corp., Cleveland, Ohio, bought the Gay Coal & Coke Co., Mount Gay, W. Va.

The 52-yr-old Gay company has assets of $1¼ million and annual sales exceeding $2 million. Last year it shipped nearly 400,000 tons. Reserves are estimated in excess of 10 million tons. Cherry Hill, which has existed as a corporate entity for only 3 yr, owns the Lucille Tipple, Hoard, W. Va., and recently bought the George's Creek Coal & Land Co., Lonaconing, Md., a coal producer since 1837. Cherry Hill also owns or has under lease 10,000 acres of coal reserves estimated at more than 30 million tons. Other properties include the McGeorge Coal Co. and a railway supply division, the Cox-McGeorge Co. Cherry Hill officers are Don McGeorge, president, A. T. Cox, Jr., vice president, James A. Butler, secretary, and D. F. Boies, treasurer.

The Reading R. R. expects to export 2,250,000 tons of anthracite in 1957 through its Philadelphia Port Richmond Terminal.

The estimate was made by Joseph A. Fisher, president of the company, who declared that the demand for all sizes of hard coal in western Europe will swell overseas shipments of anthracite. The prediction compares with anthracite exports through the Port Richmond Terminal in other years this way: in 1956 1,750,000 tons moved through the terminal; in 1955 it was less that 300,000 tons. Meanwhile, the Reading R. R. is spending $250,000 at Port Richmond for new facilities that will increase loading capacity by 50%.

West Virginia mine fatalities last year climbed to 147 as coal production was pushed to 150 million tons.

The figures are from the West Virginia State Dept. of Mines, which said that roof falls claimed the majority of lives.

Sale of the Bradbury mine near Sparta, Ill., to Zeigler Coal & Coke Co., Chicago, was completed last month.

Ownership was transferred at an undisclosed price, but Chicago sources say it is between $2 and $3 million. Zeigler bought the 7,500-acre property, which produced 850,000 tons in 1956, from Midwest Utilities Coal Corp. The acquisition will boost production of Zeigler properties to approximately 4 million tons annually. Zeigler had been operating the mine since Nov. 1 under a contract to purchase. (*Coal Age*, Dec., 1956, p 130.)

NEW SPEED AND DRILLING ECONOMY

TWO DRILLS IN ONE

Parmanco

Model 51-55 Dual

COAL DRILL

"It's a life saver to us" says W. V. Hartman, Supt. Victoria Coal Corp.

Working ahead of an 8-yard loading shovel in 4-ft. coal, speed is essential.

Traction, hydraulic and electrical system operated by 106 hp engine. Push button controls. Drills can be operated singly or in tandem.

CUTTINGS SHIELD and GUIDE—completely automatic

Blast holes, as seen in the picture, are kept clean from cuttings dropping back down the hole. A dam is formed about each blast hole excluding casual surface water.

• SEND FOR COMPLETE DETAILS

PARIS MANUFACTURING CO. PARIS, ILLINOIS

Bituminous Output

YEAR TO DATE	PRODUCTION
Jan. 19, 1957	26,771,000
Jan. 21, 1956	30,445,000

1957 output 12.1% behind 1956. A month earlier output was 7.4% above 1955.

WEEK ENDING	PRODUCTION
Jan. 19, 1957	9,880,000
Jan. 21, 1956	10,540,000

Anthracite Output

YEAR TO DATE	PRODUCTION
Jan. 19, 1957	1,292,000
Jan. 21, 1956	1,848,000

1957 output 30.1% behind 1956. A month earlier 1956 output was 8.8% ahead of 1955.

WEEK ENDING	PRODUCTION
Jan. 19, 1957	489,000
Jan. 21, 1956	682,000

Symbols of Strip Mine Efficiency

These huge walking draglines are representative of modern, highly-efficient strip mining methods. They are two of nine Marion machines owned by this company and help supply a major portion of the coal used by power and industrial plants of the Indianapolis area.

CONSULT **MARION** MINING SPECIALISTS
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Automatically "idle" the front drive in 2-wheel drive

SAVE GEARS, TIRES, GAS!

Warn Hubs make your 4-wheel drive more useful than ever, because they make it into a "free-wheeling" 2-wheel drive, as well as a 4-wheel drive! Use it either way—automatically—*as you shift!* With Warn Lock-O-matics it *always* free-wheels in 2 w.d., always engages in 4 w.d., forward or reverse, *as you shift.* You automatically reduce front end wear, engine load, tire wear in 2 w.d.—there is no drag, gear whine, shimmy. Ask your 4-wheel drive dealer for a free demonstration of Warn Lock-O-matic or Locking (manual) Hubs today, or write. Models for all 4-wheel drives to 1½ tons.

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GUYAN RESISTORS FOR MINING MACHINES

• • •

Guyan Resistors are available for all types of mining machines and loaders. No alterations are necessary. The resistors are designed to fit the original pockets of the machines.

Note the lightweight sturdy framework of angle steel fabrication. The helical coil resistance element can be removed quickly and easily should repair be necessary. Guyan Resistors are available from stock for all common types of mining machines. Resistors can be furnished for any type machine when correct information is made available.

GUYAN MACHINERY CO., *Logan, W. Va.*

Books For Coal Men

TVA Report

Annual Report of the Tennessee Valley Authority covers all aspects of the TVA program, including construction, power generation, finances, residential electricity use, local power distribution, navigation, flood control, fertilizer and munitions and forestry. *66 pp. plus appendixes. 6x9-in; paper. 60¢. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C.*

Methane Control Measures

Methane Buildup During Cutting and Continuous Mining Operations, by R. W. Stahl and C. H. Dodge. This report gives information on how mine officials and workers can curb dangers created by liberation of methane during cutting and continuous mining. *R. I. 5288. Publications-Distribution Section, Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa.*

Coal Analyses

Analyses of Tipple and Delivered Samples of Coal (Fiscal year 1955), by S. J. Aresco and R. F. Abernethy. This report includes the heating values and other characteristics of coal produced by more than 600 mines in 19 States and Alaska. *R. I. 5270. Bureau of Mines, Publications-Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Tax Tables

New Simplified Payroll-Tax Withholding Tables are new simplified combined tables designed to reduce office work. *22 tables, plus instructions. $2.95 per set. The Journal of Taxation, Inc. 147 East 50th St., New York 22, N. Y.*

Gas From Lignite

Cost Data for Gasification of Lignite in an External Heated Retort, by O. C. Ongstad, W. H. Oppelt and M. H. Chetrick, offers useful facts for estimating the cost of commercial plant for making synthesis gas from North Dakota lignite. Estimates are based on a plant with a capacity of 50 million cu ft per day. *R. I. 5272. Bureau of Mines, Publications-Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

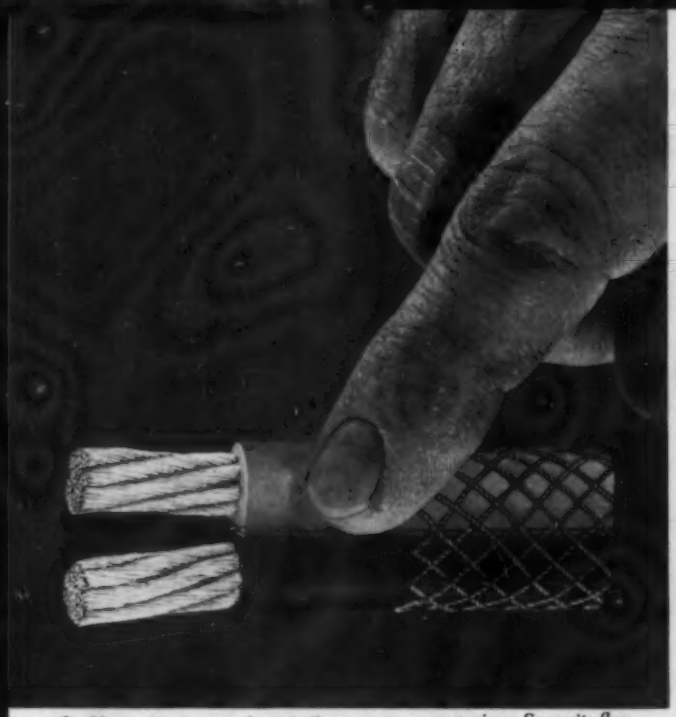
Fire Code

Fire Prevention Code is a newly revised publication by the National Board of Fire Underwriters and includes several changes and additions. Free from any of the following addresses: *85 John St., New York 38, N. Y.; 222 West Adams St., Chicago 6, Ill.; 465 California St., San Francisco 4, Calif.*

Coking Coal Reserves

The following publications by the U. S. Bureau of Mines may be obtained free upon request to Publications-Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Estimate of Known Recoverable Reserves and the Preparation Characteristics



1 **New neoprene insulation compound** gives Securityflex cable physical toughness on the INSIDE as well as the outside . . . resistance to puncture, flame and crushing.

2 **New flat stranding of grounding conductor** prevents broken wires – thus assuring continuity of operation. Full 50% wire gives peak electrical protection.

2-YEAR STUDY GIVES YOU A

New Triple Protection

shuttle car cable

Before designing the new Securityflex* cable, Anaconda engineers checked thousands of shuttle car cables of all makes to see why they failed.

They found the jacket often looked fine, but constant bending, flexing or excess tension had broken insulation or snapped conductors. To combat cable "heart failure"—Anaconda's new Securityflex cable provides *triple protection inside* to match tough outer strength.

3 New Advantages

1. Rugged high-grade neoprene insulation greatly increases resistance to puncture, flame and crushing.

2. Improved stranding of ground and power conductors prevents broken wires—assures continuity of ground.

3. Nylon breaker strip increases short circuit protection. Nylon jacket reinforcement also adds to cable strength and prevents wicking of moisture.

Full 50% Grounding Wire

In addition—full, 50% grounding wire insures greater electrical protection, longer life, and extra safeguard against excess tension. Anaconda's flat, service-proven grounding wire allows more cable on reel—will not cut insulation if cable is crushed by runovers. Millions of feet of new Securityflex have been sold without a reported failure of grounding conductor. Insist on full-size grounding conductor for safety.

Ask the Man from Anaconda or your distributor for details. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Reg. U. S. Pat. Off. 5840

3 **New nylon Anti-Short Breaker Strip*** gives Securityflex amazing crush resistance . . . minimizes short circuits between conductors even under heavy impact.

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BELT FASTENERS and RIP PLATES

FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute pull or tension uniformly.
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★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.

Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-112

FLEXIBLE STEEL LACING CO., 4638 Lexington St., Chicago 44, Ill.

of Coking Coal in Hamilton County, Tenn. R. I. 5263.

Estimate of Known Recoverable Reserves and the Preparation Characteristics of Coking Coal in Morgan County, Tenn. R. I. 5266.

Estimate of Known Recoverable Reserves of Coking Coal in Marion County, W. Va. R. I. 5267.

Carbonizing Properties of Somerset County, Pa., Coals. R. I. 5269.

EQUIPMENT APPROVALS

Twelve approvals of permissible equipment were issued by the U.S. Bureau of Mines during December.

The Jeffrey Mfg. Co.—Type 81 loader; four motors: three 15 hp, one 4 hp, 500 v, DC. Approval 2-942A, Dec. 4. (Approval 2-942 covering 250-v loaders of this type was issued to Jeffrey Mfg. Co. May 27, 1953.)

Joy Mfg. Co.—Type 5CM-1E continuous miner; five motors: two 100 hp, one 40 hp, and two 15 hp, 250 v, DC. Approval 2-1190, Dec. 4.

Joy Mfg. Co.—Types 10SC1BEPH-2 and 10SC13BPXH-2 cable reel shuttle cars; five motors: three 15 hp, two 7½ hp, 440 v, AC. Approval 2-1191A, Dec. 6.

Joy Mfg. Co.—Type 14RC1PE-1 (as modified by SBM8911) cable reel shuttle car; three motors: two 40 hp and one 15 hp, 25 v, DC. Approval 2-1192, Dec. 18.

Goodman Mfg. Co.—Type 93-36 rope belt conveyor; one motor, 25 hp, 500 v, DC. Approval 2-1193A, Dec. 18.

Goodman Mfg. Co.—Type S16-K36 rope belt conveyor; one motor, 25 hp, 500 v, DC. Approval 2-1194A, Dec. 19.

Jeffrey Mfg. Co.—Type 86A Colmol; three motors, each 50 hp, 25 v, DC. Approval 2-1195, Dec. 20.

Louisville Gas & Electric Co.—Rebuilt Goodman cable reel shuttle car; three motors, two 10 hp and one 7½ hp, 250 v, DC. Approval 2-1196, Dec. 20.

Goodman Mfg. Co.—Type 966-C tractor tread loader: four motors, each 30, 400 v, AC. Approval 2-1197A, Dec. 21.

Bethlehem Mines Corp.—Transfer car; three motors, one 10 hp and two 4 hp, 250 v, DC. Approval 2-1198, Dec. 26.

Acme Machinery Co.—Type 275 APRHJ-E air compressor; one motor, 75 hp, 250 v, DC. Approval 2-1199, Dec. 27.

Joy Mfg. Co.—Types 8SC1PE-3 and 8SC1PXE-3 cable reel shuttle cars; four motors, each 7½ hp, 250 v, DC. Approval 2-1200, Dec. 28.

FOR MINE CABLE

EXPLOSIVES RESEARCH PAYS OFF

The successful preparation of clean, sized coal for the market starts with breaking it down with explosives.

Hercules chemists and field engineers are engaged in a continuous program of research and development to make available explosives for efficient and economical blasting of coal in both deep and strip mines.

Hercules sales engineers with wide experience in mining and explosives welcome the opportunity to consult with you on your blasting procedures.

XR56-10

HERCULES POWDER COMPANY
INCORPORATED
Explosives Department, 936 King Street, Wilmington 99, Del.

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazleton, Pa.; Joplin, Mo.; Los Angeles, Calif.; New York, N. Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Calif.

HERCULES

Model CDO

instrument translates electronic weight message for direct transmission to automatic typewriter or adding machine.

Model CR

desk indicator and weight printer can be located up to 250 feet from any Fairbanks-Morse electronic motor truck or track scale.

Remote reading

instrument for belt conveyor scale shows tonnage accumulated, percent capacity load and tons per hour.

The Fairbanks-Morse Floaxial

dial (with or without printer) is applicable to all mechanical F-M motor truck, track, mine car or weigh hopper scales.

However you weigh it

The Fairbanks-Morse way is the fast, convenient, accurate and economical method of measuring coal tonnage in production or distribution. There are Fairbanks-Morse electronic and mechanical scales for every coal weighing operation—and Fairbanks-Morse electronic scales for your belt conveyors.

The Fairbanks-Morse electronic systems offer the advantage of remote indication up to 250 feet—and they will feed the weight information directly into business machines like automatic typewriters, automatic adders or motorized tape punches. It is probable that your present lever scales can be converted to semi-electronic operation—for remote reading, recording and readout through Fairbanks-Morse electronic instrumentation. Write for informative new bulletin No. ED-16, or see your F-M scale expert. Fairbanks, Morse & Co., Dept. **CA-2**, 600 South Michigan Avenue, Chicago 5, Illinois.

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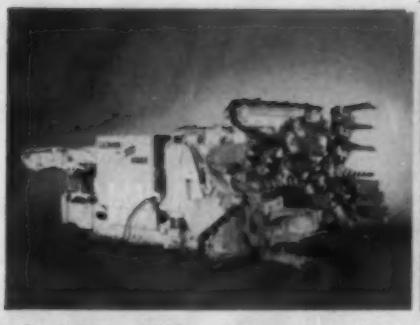
a name worth remembering when you want the BEST

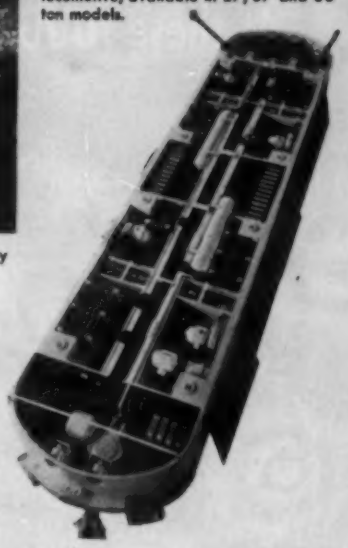
SCALES • PUMPS • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS



Goodman type 500 continuous mining machine that cuts and loads up to seven tons per minute from solid, unprepared seam.

Joy 10 — SC Shuttle Car — a rugged heavy-duty unit for dependable haulage in thick seams.

Jeffrey eight wheel, four motor trolley locomotive, available in 27, 37 and 50 ton models.



Leading Mine Equipment Manufacturers Specify

ROCKBESTOS A.V.C. Mining Cable

for Wired-in dependability
Greater productivity
Lower wire maintenance cost
Less equipment down time

For years such leading manufacturers of mining equipment as Jeffrey, Goodman, and Joy have turned to Rockbestos A.V.C. Mining Cable for wiring in motors, in controllers, between controllers and resistors and in headlights. This Rockbestos A.V.C. Mining Cable helps assure dependable service for their customers, helps keep equipment maintenance down, production time up.

Continuous miners, loaders, cutters, shuttle cars, locomotives and other mining machinery operate more efficiently, need less wire maintenance thanks to Rockbestos A.V.C. Mining Cable — the wire that's designed specially for mining equipment use.

Built to stand up and give trouble-free performance, Rockbestos A.V.C. will not ignite or carry flame . . . remains flexible . . . won't dry out or crack . . . safely takes heating overloads . . . won't bloom or rot when exposed to grease and oil . . . fits bushings right.

When buying new mining equipment, or servicing old . . . be sure . . . *specify and insist on Rockbestos A.V.C. Mining Cable.*

ORDER FROM THESE JOBBERS — SPECIFY "ROCKBESTOS A.V.C."

BECKLEY, W. VA.
National Mine Service Co.
BIRMINGHAM, ALA.
Moore-Handley Hardware Co.
BLUEFIELD, W. VA.
Superior-Sterling Co.
CHARLESTON, W. VA.
Charleston Electric Supply Co.
CLARKSBURG, W. VA.
Westinghouse Electric Supply Co.
COWEN, W. VA.
Pennsylvania & W. Virginia Supply Corp.
ELM GROVE, W. VA.
Pennsylvania & W. Virginia Supply Corp.
EVANSVILLE, IND
Evansville Electric & Manufacturing Co.
FAIRMONT, W. VA.
Fairmont Supply Co.
GREENSBURG, PA.
Westmoreland Hardware Co.
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Kentucky Mine & Supply Co., Inc.
HUNTINGTON, W. VA.
Banks-Miller Supply Co.
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National Mine Service Co.
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Pennsylvania Electric Engineering Co.
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Westinghouse Electric Supply Co.
WASHINGTON, PA.
Fairmont Supply Co.
WILLIAMSON, W. VA.
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NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH
ST. LOUIS • LOS ANGELES • OAKLAND, CALIFORNIA • NEW ORLEANS • SEATTLE

At these TOUGH WEAR points, specify "THE TOUGHEST STEEL KNOWN"*

Sprockets
Amsco® Manganese Steel sprockets and replaceable rims, hardfaced with Amsco "Economy Hardface C", give 3 to 4 times the life of ordinary sprockets.

Rollers, Idlers
Automatic build-up, then hardfacing with Amsco AW-79 Rod, gives twice the wear of original parts, saves 50% on replacement.

Track Shoes
Manganese Steel construction, with grouser bar integrally cast, and holes counter-sunk so bolts can be re-used. For temporary repair, grouser bar is torch cut and welded to shoe.

End Bits
Corner inserts of Amsco Manganese Steel add extra service life to blade. Amsco HF-40 hardfacing further increases wear resistance.

Scraper Blades
Amsco Manganese Steel gives longer lasting "bite". Amsco HF-40 is ideal for hardfacing.

*AMSCO MANGANESE STEEL . . . plus AMSCO HARDFACING

Shown above are just a few of the "tough wear" points where Amsco products can save you money. Whether for original parts, or for build-up and hardfacing, specify Amsco Manganese Steel and Amsco Hardfacing for maximum operating economy.

We'll be glad to give you full information on Amsco Tractor Parts, Hardfacing Materials or Automatic Welding Machines. Just call your nearby Amsco representative, or write us direct.

OTHER AMSCO PRODUCTS

DIGGING: backhoe buckets—dippers and parts—repointers—dragline bucket parts—dragline chain—sheaves—pinions.

CRUSHING: concaves—mantles—jaw plates—mill liners—hammers.

HANDLING: truck bed liners—grizzly parts—car wheels and liners—sheaves, gears, pinions.

WELDING: automatic and semi-automatic welders—hardfacing rod—manganese plates and shapes.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DEL., OAKLAND, CAL., ST. LOUIS; JOLIETTE, QUEBEC

ALEMITE Announces

the all-new SURGEPRUF LINES OF REUSABLE COUPLINGS AND RUBBER HOSE

...Available Now Nationwide!

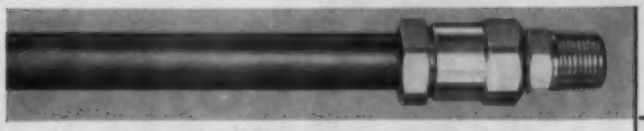
Now, for the first time, Alemite brings you a completely new line of *reusable, non-skive* couplings and hydraulic rubber hose—exclusively designed for faster, more economical replacements . . . to cut maintenance costs, downtime and inventories!

Rugged Alemite Surgepruf Couplings meet practically any original equipment or field replacement need. Hose are available for either medium-high or high-pressure service, with single or double wire braid. Couplings are made of high-strength steel . . . and J.I.C. thread design assures positive, long-lasting seal.

Contact your nearest Alemite Distributor for full details. Standardize—*save money*—on the complete new line of superior Alemite Surgepruf equipment!

Only Alemite Surgepruf Couplings Offer All These Advantages for Faster On-the-spot Replacements and Repairs!

- NO HOSE-SKIVING REQUIRED! "Double-wedge" grip forces coupling threads through rubber cover . . . grips either single or double wire braid solidly. Saves both time and labor!
- GIVES TIGHTER GRIP! Double-wedging action gives tighter grip as insert is drawn farther into coupling.
- NO SPECIAL ASSEMBLY TOOLS REQUIRED! Fast, easy assembly with just ordinary tools!
- TYPES AND SIZES FOR ALL HYDRAULIC LINES.



New Alemite Surgepruf Couplings and Hose Have Been Factory-tested and Field-proved!

ALEMITE
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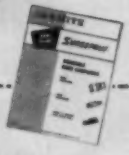
STEWART SW WARNER

Division of STEWART-WARNER CORPORATION



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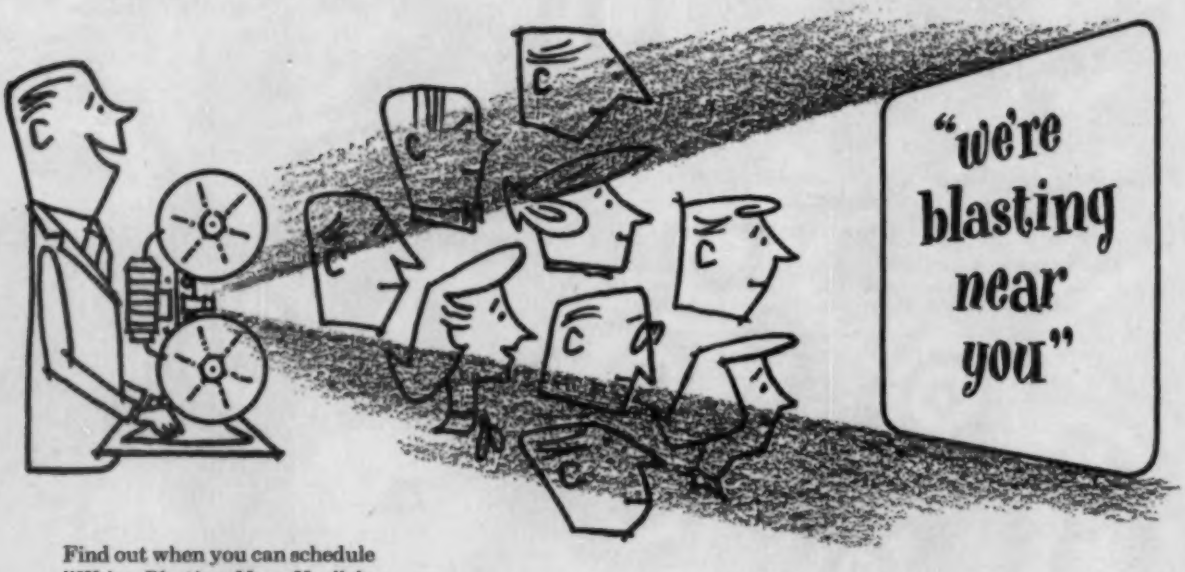
Here's a new, effective way to aid your public relations in the communities where you are blasting. It's the interesting, informative sound film in color, entitled, "*We're Blasting Near You.*"

This movie tells why blasting is necessary, and the steps you are taking to be a "good neighbor." It shows how millisecond delay techniques eliminate the old fashioned, jarring explosions of the past . . . how modern blasting methods hold noise to a muffled minimum and make vibration unnoticeable.

"*We're Blasting Near You*" can be shown to any age group: schools, service clubs, civic organizations. It is accompanied by a kit which includes suggested news releases, a sample introductory speech for the person presenting it as well as safety posters, and other helpful material. Show this unique new movie in your area. It can be an important help to you.

New film...

builds goodwill for users of explosives



Find out when you can schedule "*We're Blasting Near You*" in your community. And ask for "*Better Blasting,*" the Atlas newsletter on latest methods and materials.

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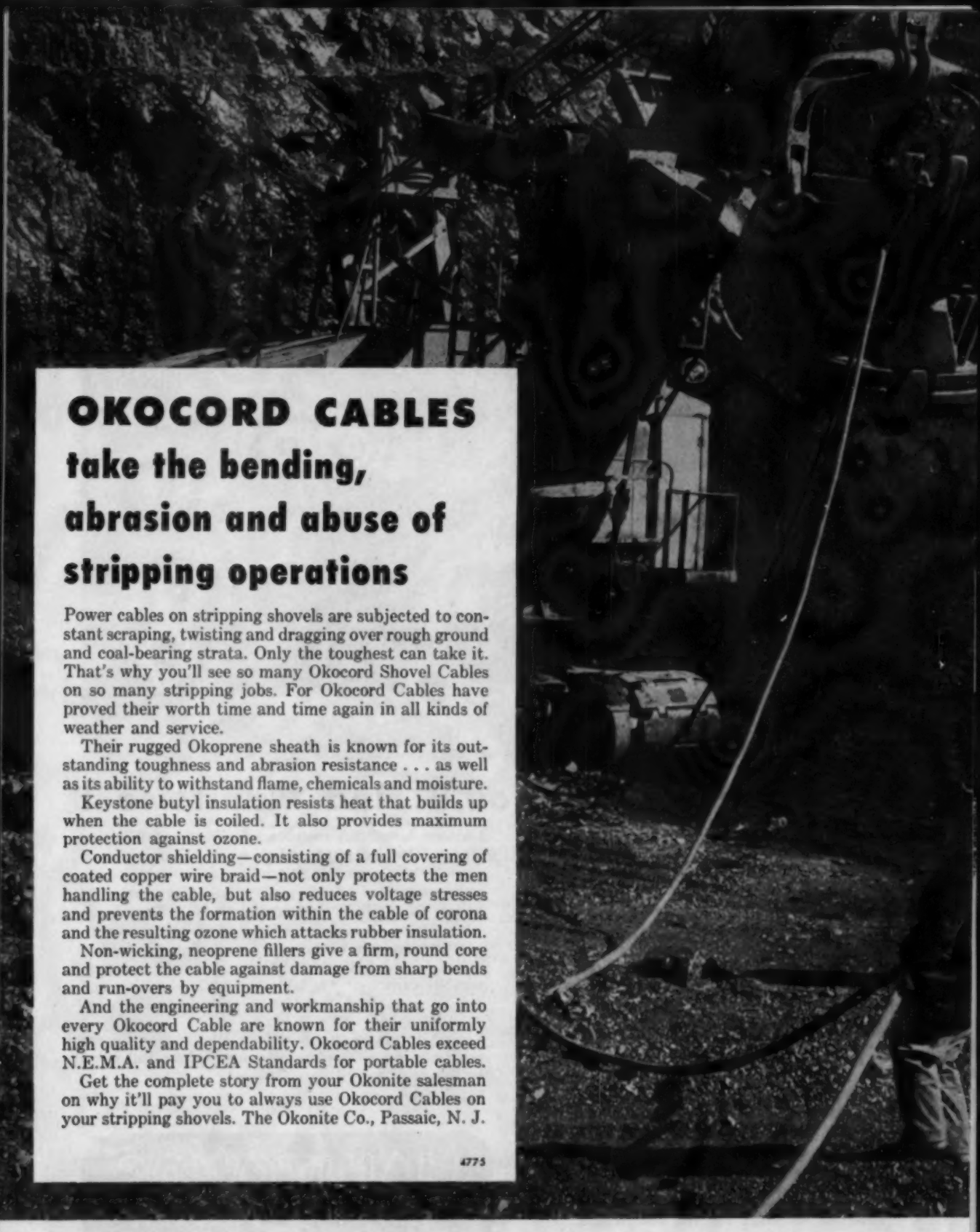

OKOCORD CABLES take the bending, abrasion and abuse of stripping operations

Power cables on stripping shovels are subjected to constant scraping, twisting and dragging over rough ground and coal-bearing strata. Only the toughest can take it. That's why you'll see so many Okocord Shovel Cables on so many stripping jobs. For Okocord Cables have proved their worth time and time again in all kinds of weather and service.

Their rugged Okoprene sheath is known for its outstanding toughness and abrasion resistance . . . as well as its ability to withstand flame, chemicals and moisture.

Keystone butyl insulation resists heat that builds up when the cable is coiled. It also provides maximum protection against ozone.

Conductor shielding—consisting of a full covering of coated copper wire braid—not only protects the men handling the cable, but also reduces voltage stresses and prevents the formation within the cable of corona and the resulting ozone which attacks rubber insulation.

Non-wicking, neoprene fillers give a firm, round core and protect the cable against damage from sharp bends and run-overs by equipment.

And the engineering and workmanship that go into every Okocord Cable are known for their uniformly high quality and dependability. Okocord Cables exceed N.E.M.A. and IPCEA Standards for portable cables.

Get the complete story from your Okonite salesman on why it'll pay you to always use Okocord Cables on your stripping shovels. The Okonite Co., Passaic, N. J.

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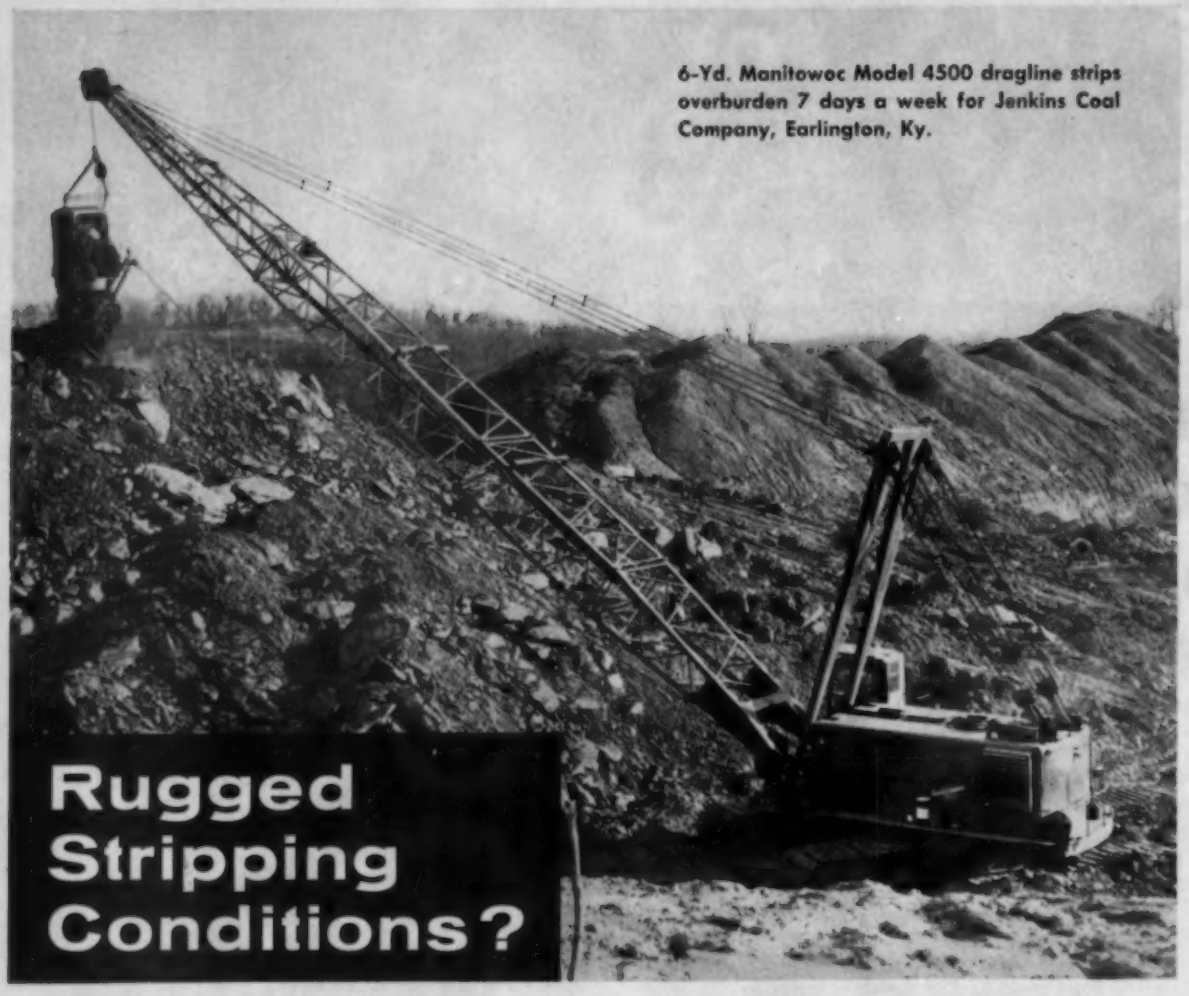
where there's electrical power . . . there's **OKONITE CABLE**



6-Yd. Manitowoc Model 4500 dragline strips overburden 7 days a week for Jenkins Coal Company, Earlington, Ky.

Rugged Stripping Conditions?

On the Tough Jobs You'll Find Manitowoc!

When rough stripping conditions keep your balance sheet light on the profit side, look to the big capacity Manitowoc Model 4500 for economical coal stripping. For stripping operations that pay off you want a machine with a relatively low investment; that can be easily assembled and serviced by ordinary mechanics, far from metropolitan areas; and one that is mobile enough to move easily from one isolated job site to the next. With the Manitowoc Model 4500 you get all these advantages plus the big capacity production of a 5½-yd. shovel or 6-yd. dragline.

Ready For Rugged Conditions

Rolling, rocky terrain having steep grades and overburden of various depths is typical rugged stripping country. Here's where a Manitowoc 4500 really earns its salt! That's because a 4500 will handle unusually steep grades easy as a "cat" . . . and it has the long reach and steady stability to eliminate excessive re-handling of overburden.

Superior Features For The Tough Jobs

With the Manitowoc 4500 you get a big production unit having the speed and mobility of a small rig. Unmatched stability assures a long reach at full bucket capacities with less ground pressures. Elimination of several electric motors and miles of intricate wiring and connections affords more efficient utilization of power. No trailing cable to restrict mobility on the job — allows operations far from power source. Transport between jobs on railroad cars or highway trailers is simple and fast — days shorter than units of comparable capacity. Available as 6-yd. dragline and 5½-yd. shovel with standard or high-lift booms.

Your Manitowoc distributor has all the facts on the profit-making 4500 — see him now for the full story.

MANITOWOC ENGINEERING CORP.
MANITOWOC, WIS.

MANITOWOC
SHOVELS 1-5½ YD. Speedcrane CRANES 20-100 TON

CONTACT SPRAGUE & HENWOOD, Inc.

FOR ALL OF YOUR DIAMOND DRILLING NEEDS

CONTRACT DIAMOND DRILLING ANYWHERE

Many, many firms throughout the United States and the world know the advantages of core drilling; and Sprague & Henwood, with more than 70 years of experience, is the leader in this field. Sprague & Henwood crews have completed thousands of contracts successfully in every conceivable condition. For the best in exploratory core drilling (surface or underground), blast hole drilling, directional drilling, foundation test drilling, grout hole drilling, and pressure grouting—be sure to call Sprague & Henwood. Estimates and suggestions given without charge.

"ORIENTED" DIAMOND CORING BIT

IMPREGNATED CORING BIT

"ORIENTED" DIAMOND "TAPER" TYPE NON-CORING BIT

DOUBLE-TUBE REAMING SHELL

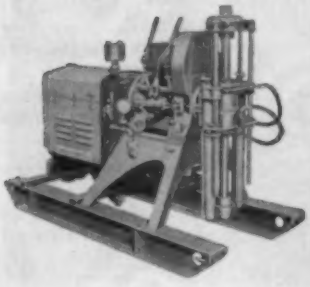
"ORIENTED" DIAMOND BITS

Any bit you buy will work for a while. But if you specify or order Sprague & Henwood "Oriented" Diamond Bits, giving all information on your drilling conditions, you will receive the bit or bits that will do the best job for you. Lower your cost per foot, with a minimum of diamond loss. Write today for complete "Oriented" Diamond Bit Bulletin #320-1.

RESETTING SERVICE

Send in your bits that need resetting, giving full details of results obtained and conditions under which bits were used. They will be returned new—and "Oriented" to give you less diamond loss and lower your cost per foot.

FIELD TESTED DRILLING MACHINES

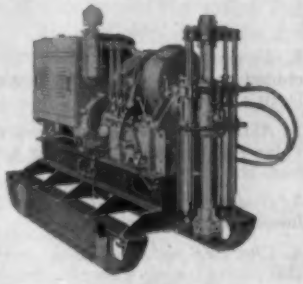


MODEL 40-C CORE DRILL MACHINE

Field Tested means just that . . . with contract work being done under every conceivable condition, Sprague & Henwood drilling machines have to perform right. Different sizes and types to meet various conditions are available. Your conditions should be given in detail, and recommendations will be forwarded to you immediately, without cost.

ACCESSORY EQUIPMENT

In addition to drilling machines, and diamond bits, Sprague & Henwood manufactures and can supply you with a complete line of accessory equipment necessary to make up a drilling outfit, such as drill rods, core barrels, casings, fishing tools, etc. A new and most complete Catalog, No. 400, listing all accessory equipment is available to you. Write today for your free copy. It will be mailed promptly.



MODEL 142 CORE DRILL MACHINE

SPRAGUE & HENWOOD, Inc.

SCRANTON 2, PA.

S&H SINCE 1853

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LOW HAULING COSTS COME RIGHT FROM THE "HEART" OF A '57 CHEVY

Many of the things that make a Chevrolet truck more economical to run are seldom seen by the owner. They're hidden features, deep in the truck's design. Here are just a few of them, to prove a Chevy's engineered better and built better for bigger savings!

1. *Forged steel crankshaft*—It's extra sturdy, precision machined and balanced, the foundation for dependable, long-lasting power!

2. *Aldipped exhaust valves**—Special aluminum treatment on valve surface protects valves against pitting; engine wears less, costs you less to run!

3. *Hydraulic valve lifters*—for longer valve life in V8's, fewer engine repair jobs.

4. *Chevy V8 piston*—Thanks to *short-stroke* V8 engine design, this piston travels a shorter distance, wears less. Short-stroke efficiency aids fuel economy, too!

5. *Oil-bath air cleaner—standard* on all Chevrolet truck engines for added protection against dust and foreign matter that shorten engine life.

6. *High-capacity oil filters***—They remove dirt particles from Chevy engine oil to cut engine wear and maintenance.

7. *Easy-adjust distributor points*—You can adjust this new Chevy V8 distributor *with the engine running*; it's added insurance against costly down time.

8. *Multiple fuel filters*—For *clean* fuel, all Chevy engines have fuel filters in the carburetor and fuel tank; in addition, V8's provide an *extra* filter at the carburetor.

9. *Ball-Gear steering mechanism*—Inside this steering gear scores of polished steel balls virtually eliminate friction. Less friction means less wear, less maintenance!

10. *Rugged manual transmission*—Synchro-Mesh design eliminates the need for double-clutching, reduces costly wear. Gears are shot-peened for extra strength.

11. *12-volt battery*—provides sure starting, good ignition, long battery life in all Chevrolet trucks.

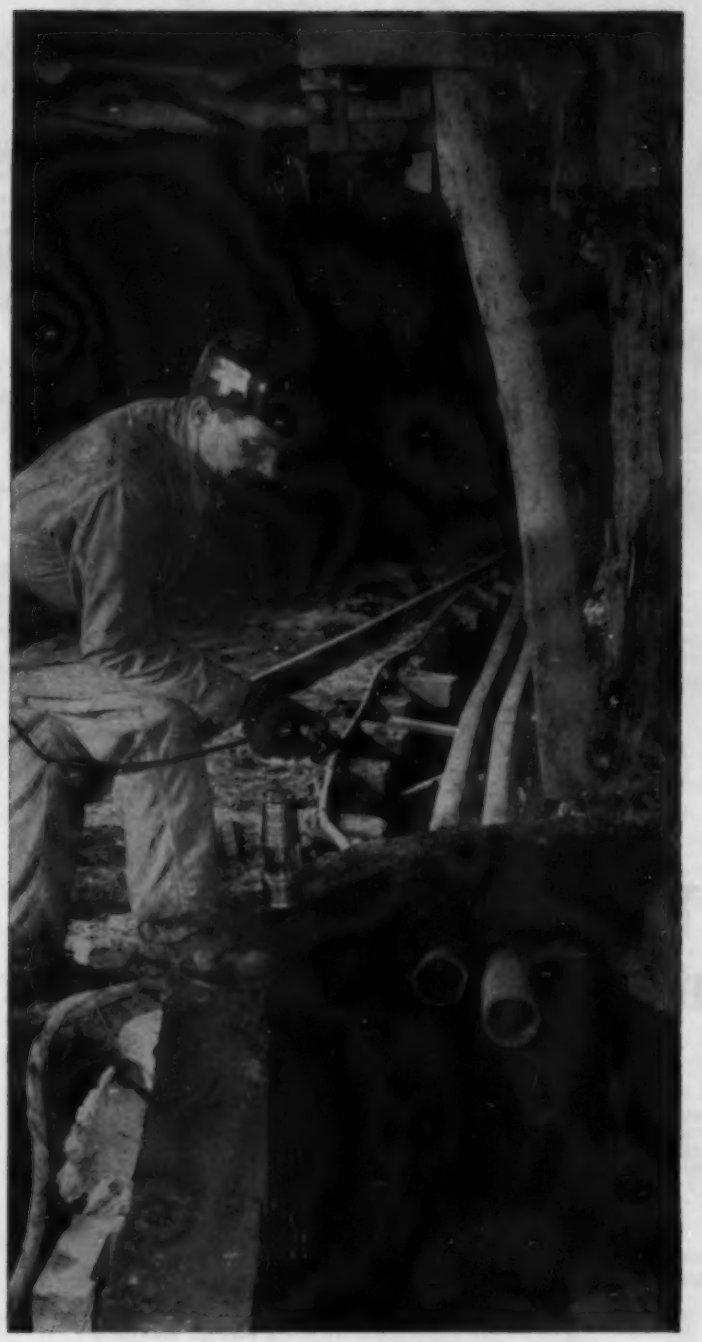
And there are many more! See your Chevrolet dealer for all the dollar-saving facts. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**On Thriftmaster 6, Trademaster V8.*
***Standard on V8's and Jobmaster, optional on Thriftmaster 6.*

1957 CHEVROLET TASK·FORCE TRUCKS

PROVED ON THE ALCAN HIGHWAY . . . CHAMPS OF EVERY WEIGHT CLASS! CHEVROLET

CUT CORROSION LOSSES . . . with



Gravity flow of mine water from a high sump to a low sump through two four-inch diameter lengths of NATIONAL Polyethylene Pipe.

USS NATIONAL* Polyethylene PIPE

CORROSION, one of the major destructive forces of a coal mine's atmosphere, has no effect on NATIONAL Polyethylene Pipe. It is resistant to most acids, alkalis, salts and a wide variety of other chemicals. Thus, you can install it and forget about it.

NATIONAL Polyethylene Pipe is tough, too. Rough handling won't crack it, even at low temperatures. And it remains rugged and flexible over its entire working range from minus 90°F. to plus 120°F.

Light and flexible, polyethylene pipe unrolls like hose, making it extremely easy to install. And, since it will turn corners and go over or under obstructions, few joints are necessary. However, when a connection is used, the pipe is easy to cut and the insert-type fittings are quickly secured with stainless steel clamps. Ells, tees, couplings and reducers are available to suit any layout.

Manufactured from pure 100% "on grade" polyethylene raw material, NATIONAL Polyethylene Pipe is available in sizes from ½-inch to 6 inches in diameter, in a variety of wall thicknesses. For complete information on the use of NATIONAL Polyethylene Pipe, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

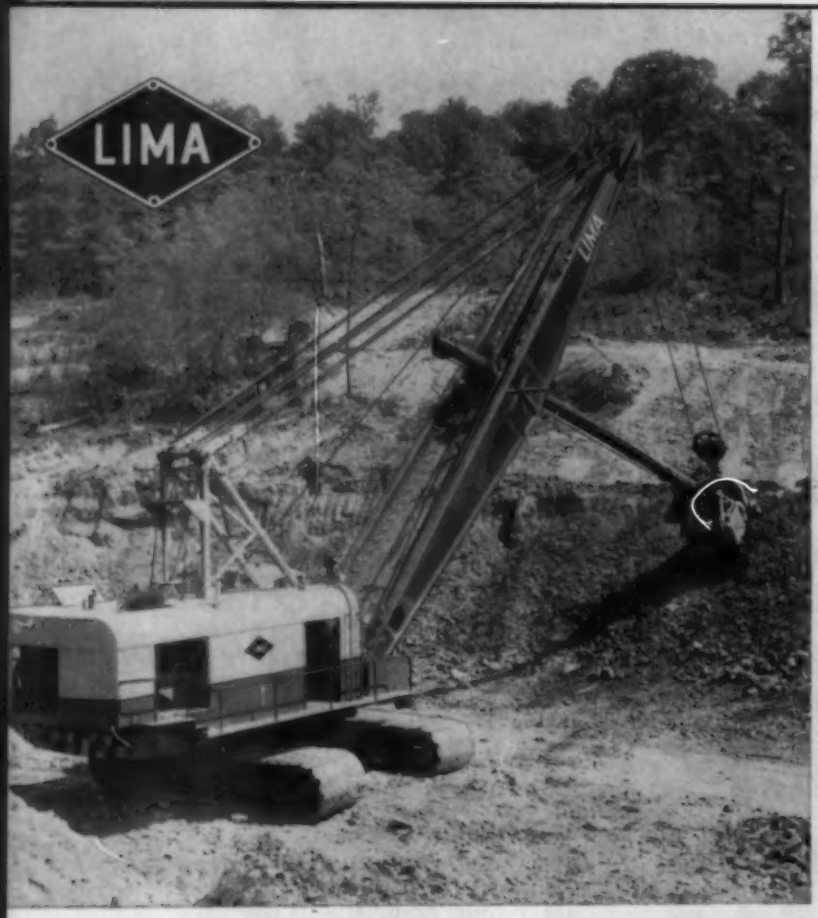
*Trademark

NATIONAL TUBE DIVISION
UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS NATIONAL Polyethylene PIPE

UNITED STATES STEEL

AVAILABLE IN FIVE TYPES



Lima Type 2400 Shovel, equipped with 67-ft. boom, 50-ft. dipper handle, and 4-cu yd bucket, stripping coal near New Bethlehem, Pa.

Lima Type 1201 Dragline, with 100-ft. boom, stripping iron ore at Russellville, Ala.

Lima Type 34 Paymaster Shovel loading coal near Denver, Colo

LIMAS ARE BUILT FROM THE GROUND UP
for high-output stripping and loading

The toughest mantle rock can't stop Limas . . . they strip away overburden with ease, get coal and ore loaded fast. Take a look at some of the features that make the Lima Type 2400 (shown at left above) a favorite:

CRAWLERS are wide and long for greater stability and are steered through air-controlled jaw clutches for ease of handling in close quarters.

TREAD ROLLERS have especially hardened rims to resist wear . . . have piston-ring-type dirt seals and retainers.

MAIN MACHINERY is located so as to hold counterweight to a minimum and to allow faster swing.

DRUMS are mounted in tandem, making it possible to use extra-wide drums . . . a big advantage when operating as a dragline, crane or high-lift shovel, because of the greater cable capacity and longer cable life.

ANTI-FRICTION BEARINGS in the drums hold the brake and clutch surfaces permanently concentric with the center of the shafts, giving smooth, velvety action when they are engaged.

EXTRA-LARGE AIR-CONTROLLED CLUTCHES respond immediately to the slightest movement of the controls.

TORQUE CONVERTER gives greater output, reduces shock loading, prevents engine stall . . . cushioned effect of drive lengthens cable life, reduces machinery maintenance.

PRECISION AIR CONTROL lessens operator fatigue, gives constant feel of the work, means more output with less effort.

Get the full story on the Type 2400 and other profit-making Limas from your nearby Lima distributor, or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

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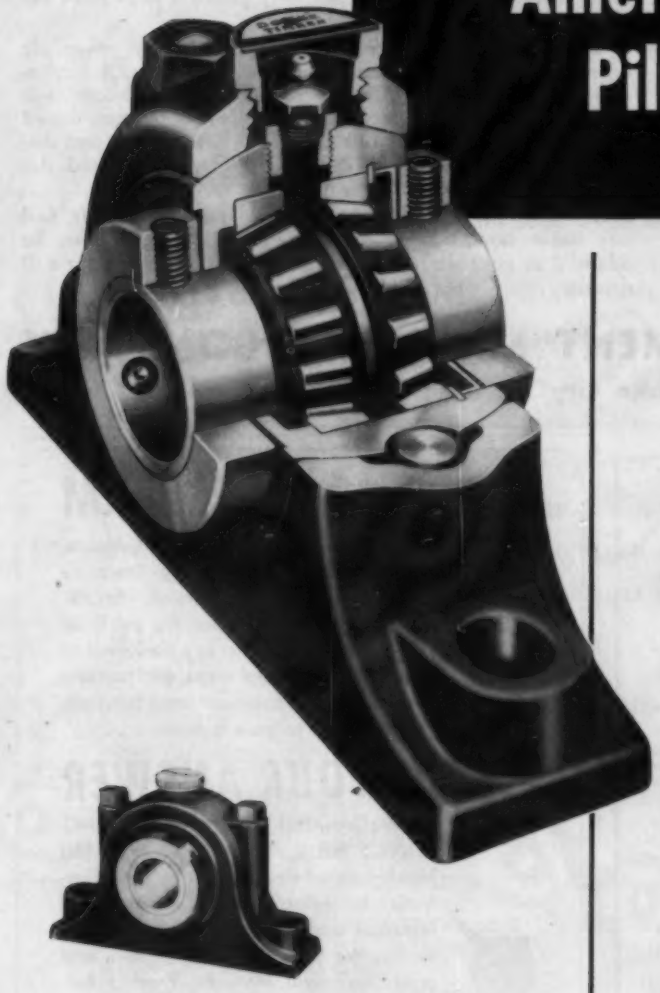
BALDWIN - LIMA - HAMILTON

Construction Equipment Division — LIMA WORKS

OTHER DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation • Hamilton • Loewy-Hydropress • Madsen • Pelton • Standard Steel Works

AVAILABLE IN FIVE TYPES
FOR ALL KINDS OF SERVICE

DODGE-TIMKEN
America's Quality Pillow Block



- COMPLETELY ASSEMBLED
- FACTORY ADJUSTED
- PRE-LUBRICATED

Call the Transmissioneer, your local Dodge Distributor. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE-TIMKEN Bearings are adjusted, lubricated and sealed at the factory. Labrynth seals effectively retain the lubricant and prevent the entrance of dust and dirt. The inbuilt precision of Dodge-Timken Bearings is protected both on and off the shaft. They are delivered fully assembled, ready to mount.

Where service conditions are toughest Dodge-Timken Bearings prove their quality decisively. For superior performance, dependability and long life they have won their reputation throughout industry as America's quality pillow blocks.

To meet varying service requirements Dodge-Timken Pillow Blocks are available in five types—the type E . . Double Interlock (illustrated) . . Type C . . Special Duty . . . and All-Steel. Available in a range of shaft sizes from 1-3/16" to 10".

Call your Transmissioneer; or write for Bulletin A638 giving load ratings, dimensions and other data on Dodge-Timken Roller Bearings.

DODGE MANUFACTURING CORPORATION
3000 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

New Cryderman Mucker Sinks Slopes Faster

Cryderman Shaft Mucker starting work from surface

Low-Cost, Air-Operated Loader Eliminates Hand Operations, Saves Labor and Speeds Driving of Inclined Shafts and Slopes

THE NEW INCLINE CRYDERMAN SHAFT MUCKER featuring non-rotating clam bucket, square boom and telescopic air tubing is a machine of sturdy construction especially built for the rugged job of shaft mucking.

Already proven under actual shaft driving conditions, the Cryderman eliminates the fatigue of archaic hand operations, for a faster and easier job. Your only problem is to hoist the rock as fast as it is loaded.

With two control levers, the operator actuates seven air cylinders that power the entire mucking operation. Air cylinders provide the lift and swing of the telescopic boom as it extends like a human arm, with any desired pressure, to crowd into the muck pile for a full clam load, then retract and discharge into the muck skip. No gravity force is required. All action is positively controlled by the operator.

If you are considering sinking a slope or inclined shaft, find out today how this revolutionary CRYDERMAN can be adapted to your shaft job. Write, wire or phone us for full details.

SHAFT AND DEVELOPMENT MACHINES COMPANY

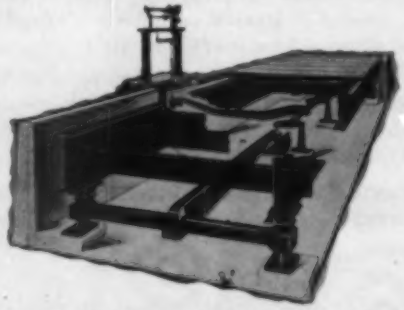
808 Newhouse Building, Salt Lake City 12, Utah, Phone EMpire 3-5373

WINSLOW SCALES

Dependable — Accurate

FOR TRUCKS and TRACTOR TRAILERS

TYPE "C S" *Portable Scale*—easily and quickly set up—with preparation held to minimum.



TYPE "S" *Pit Scale*—for weighing trucks and tractor trailers—Platform lengths 18 ft. to 60 ft. inclusive.

WINSLOW SCALE COMPANY

P.O. Box 1198, TERRE HAUTE 1, INDIANA

Scale Manufacturers since 1896 Phone: North 6515

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Many Hungarian technicians with hard-to-get skills are available for immediate employment

A brand new source of skilled manpower is available now to American industry. If you believe you might use one or more Hungarian technicians, now at Camp Kilmer, New Jersey, write to:

President's Committee for Hungarian Refugee Relief, Camp Kilmer, New Jersey

While the column at the right includes only a partial listing of skills, many others are also available. Specify your job qualifications . . . describe your business . . . tell whether a knowledge of English is required and outline the housing situation. Arrangements may be made to interview applicants at Camp Kilmer if you care to do so. Should you hire a Hungarian technician you will not be obliged to pay for either his housing or his transportation from Camp Kilmer.

Your voluntary and enthusiastic cooperation can help meet an emergency situation. The A.F.L.-C.I.O. endorses this project and you will join with other corporations, relief agencies, universities, churches and thousands of civic leaders in a great undertaking. The operating staff of the President's Committee will also welcome your active interest.

A partial listing of skills

- Airplane Repairmen
- Architects
- Chemists
- Construction Machinery Operators
- Designers
- Draftsmen
- Electricians
- Engineers — Chemical
- Engineers — Civil
- Engineers — Electrical
- Engineers — Mechanical
- Engineers — Mining
- Fabrication Metal Products
- Fabrication of Textile Production
- Foremen Construction
- Furnacemen Smelters Pourers
- Loom Fixers
- Machine Shop
- Miners Mining Machine Operators
- Power Station Operators
- Radio Operators
- Surveyors
- Tinsmiths Coppersmiths
- Toolmakers Die Sinkers Setters
- Weavers Textile
- Welders Flame Cutters

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SIMPLEX MINE JACKS

3 HUSKY MINERS

★ Ratchet lowering type for extra safety
★ 5-tons capacity
★ Double-lever sockets permit lifting in close quarters
★ Full capacity on cap OR toe
★ Safety Speed Trigger
★ Ideal for re-railing, repairs, skidding

No. 84A for Thin Seams 14" high, 7" lift

No. 85A for Medium Seams 17" high, 10" lift

No. 86A for Thick Seams 20" high, 13" lift

Hi-Speed TIMBER JACK

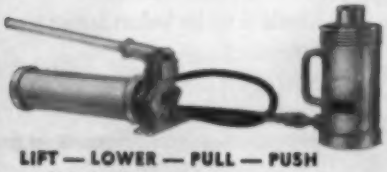
Gear Cover Not Shown

Screw Insures Safety

Bevel Gears and Crank Twice as Fast as Lever Nut Type

MODEL No. 642 LIFTS 6 TONS

Combines safety of screw jack with fast action of crank. Head swivels. Five models with min. ht. from 3'6", max. ht. to 9'6".



LIFT — LOWER — PULL — PUSH — Safely from a Distance

Re-Mo-Trol hydraulic pump and remote controlled ram and puller works in tight spots—in any position. Ram or puller can be operated from 6' or more away. Models from 10 to 100-tons, from 30-tons with famous Simplex "Center-Hole" for easier, safer pulling.

Write for Bulletin Mines 55 for data on the most complete line of Mine Jacks

WORLD'S LARGEST MFRS. OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS

SIMPLEX RE-MO-TROL UTIL-A-TOOL **JACKS** JENNY ROL-TOE

TEMPLETON, KENLY & CO.
2501 Gardner Road
Broadview, Illinois

Thousands of Coal Mine Officials Helped Prepare Your 1956 Coal Age Mining Guidebook

Why Not Profit From Others' Experience?

When you're looking for new ideas, need a fresh slant on your operating problems or just want to check the latest in mining methods or equipment, the Mid-July 1956 COAL AGE Mining Guidebook a practical on-the-job refer- is a good place to start. You'll find the Guidebook a practical on-the-job reference manual for every-day use—simply because it reports, analyzes and briefs the current operating practice and results at hundreds of the most efficient mines. Here in one volume are the ideas and experience of thousands of successful operating men.

No matter what your job—in deep mining or stripping, maintenance, preparation, supply handling or safety—you'll find the COAL AGE Guidebook a worthwhile working tool. Remember too, the 62-page Buying Directory Section lists all the known manufacturers of over 1,000 products used in coal mining, completely revised and up-dated for the 1956 issue. This directory, along with the manufacturers' advertising and the Index to Advertisers, Sales Offices and Distributors, will help you quickly locate the supply source nearest you.

KEEP YOUR 1956 GUIDEBOOK HANDY . . . USE IT REGULARLY

Thermocoal Belting

EVERYTHING THE U.S.B.M. REQUIRES*

...and more!

When you order conveyor belting for underground coal mine use, be sure it's new, fire-resistant Thermocoal—the belt that bears acceptance designation #28-13 of the U.S. Bureau of Mines.

You'll not only have a belt that meets or exceeds all after-flame and after-glow tests . . . you'll also benefit from typical Thermoid toughness. Thermocoal Belts are engineered for high resistance to flexing and impact, edge wear, abrasion and mildew. You can specify either 4 or 6 ply construction of the strongest cotton or cotton-nylon duck—impregnated with specially compounded Thermoid rubber stocks to assure longer life, lower costs.

**U.S.B.M. acceptance designation #28-13.*

Order Thermocoal Belting through your Thermoid Distributor, or write direct for detailed information and data sheets.

Make Thermoid your choice, too, for Multi-V Belts...

... and Hose manufactured with your needs in mind.

Thermoid

Thermoid Company
Trenton, New Jersey
Nephi, Utah

Typical Installation on Main Haulage

- Rugged.
- Low in Cost.
- Easy to Install
- Increases Production.

"Cheatham Switch"

TRACK SWITCH THROWER ELECTRICALLY OPERATED

This modern track switch is thrown swiftly and safely by motormen as they sit in their cabs. It saves time and money, and is fool-proof and dependable!

Over 50 years experience manufacturing

ELECTRIC TRACK SWITCHES and DERAILS

Write for Catalog

CHEATHAM ELECTRIC SWITCHING DEVICE CO.
INCORPORATED
4780 Crittenden Drive, Louisville, Ky.

NUSSCO AUTOMATIC BLOCK SIGNALS FOR MINES

Save Trip Time on Main Haulage
Prevent Collisions

A two wire cable connects two or more signals together into one block. Only one signal can show proceed on the entrance of a train, all other signals show stop.

NACHOD & UNITED STATES SIGNAL CO.
INCORPORATED
4771 Louisville Ave., Louisville, Ky.

Here's the Most Complete BUYERS' GUIDE You Can Find!

The 62-page Buying Directory in your COAL AGE Mining Guidebook lists for speedy reference all the known manufacturers of over 1,000 products used in coal mining, completely revised and up-dated for the 1956 edition. This comprehensive guide, along with the manufacturers' advertising and the Index to Advertisers' Sales Offices and Distributors, will help you quickly locate the nearest source of equipment, materials and services meeting your particular needs.

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An established annual service for all COAL AGE subscribers

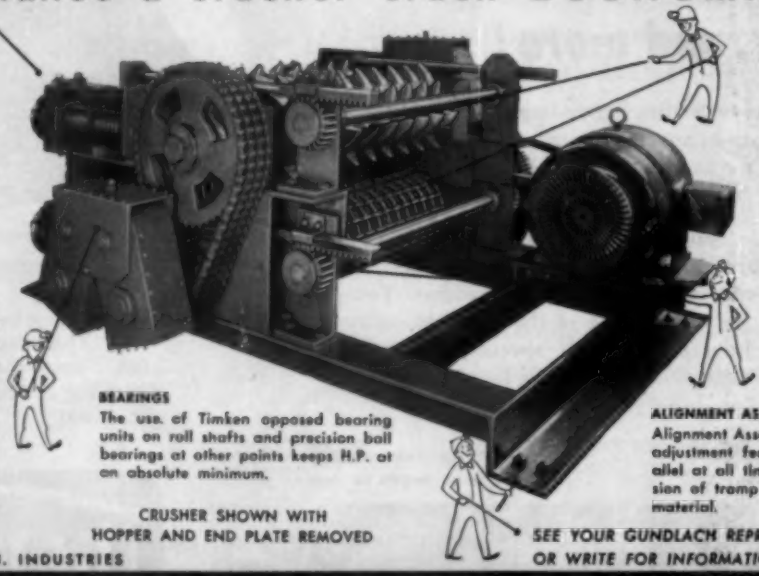
GUNDLACH CRUSHERS

ACCURATE SIZING . . . ECONOMICALLY

What makes a crusher crush ECONOMICALLY?

ADJUSTMENT ASSEMBLY
Upper and lower rolls can be adjusted by a turn of hand wheel while Crusher is in operation. This easy adjustment feature gives operator a definite control of top size of the crushed product . . . between ¾" and 6" top size.

GEAR BOX
The timing of the rolls on each stage is accomplished by means of this unique Gear Box, containing 2 drive gears and 2 idler gears, which are always in full mesh. All gears are steel, cut and hardened. Uses self-contained oil splash lubricating.



BEARINGS
The use of Timken opposed bearing units on roll shafts and precision ball bearings at other points keeps H.P. at an absolute minimum.

CRUSHER SHOWN WITH HOPPER AND END PLATE REMOVED

UPPER ROLLS
Heavy one-piece cast steel construction. Striking sides and surfaces hard-faced with self-hardening rod give added life and decrease maintenance cost.

LOWER ROLLS
Heavy cast steel construction. Each tooth and striking surface hard-faced with self-hardening rod. Pocket-Tooth design gives a negligent percentage of oversize and a minimum of fines.

ALIGNMENT ASSEMBLY
Alignment Assembly, interlocked with adjustment feature, keeps rolls parallel at all times, even upon admission of tramp iron or non-crushable material.

SEE YOUR GUNDLACH REPRESENTATIVE OR WRITE FOR INFORMATION

DIVISION OF J. M. J. INDUSTRIES

T. J. GUNDLACH MACHINE CO. 226 CENTREVILLE BELLEVILLE, ILL.

Trenton, New Jersey
Nephi, Utah

WIRE ROPE AT WORK

One of the most interesting hoist installations in the country is now operating at the Cliffs Shaft Mine, owned by Cleveland-Cliffs Iron Company, Ishpeming, Mich. At the new "C" shaft, two friction-drive Koepe hoists raise and lower the skips, and a third takes care of the man and service cage. Speed for the skips is 1500 ft per min; for the cage, 1000 ft per min. Addition of these facilities has made it possible to hoist the mine's ore output in one shift per day.

The Koepe hoists, first installation of this type in the United States, are of the four-cable type using wire ropes 1 in. in diam. Balancing tail ropes are also employed on each unit. For the hoist cables, Bethlehem 6 x 27 flattened strand was chosen. For the tail lines, Bethlehem designed a non-rotating Seale. Both these classes of rope have given excellent service, and they demonstrate clearly the importance of careful selection for specialized applications.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

MINING • QUARRYING • CONSTRUCTION • EXCAVATING • PETROLEUM • LOGGING • MANUFACTURING

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: BUSINESS: "OPPORTUNITIES" EQUIPMENT USED OR RESALE

SHOVELS—DRAGLINES
DRILLS
CRANES—EUCLIDS

625 Page Diesel Drag, 160', 9 yard
6160 Monigan Drag, 160', 8 yard
625 Page Diesel Drag, 150', 10 yard
4500 Manitowoc Drag, 140', 4½ yard
621-S Page Diesel Drag, 135', 6 yard
7200 Marion Diesel Drag, 135', 5¾ yard
621-S Page Diesel Drag, 125', 7½ yard
200-W Bucyrus Monighan Drag, 125'
7-W Monighan Elec. Drag, 120', 7 yard
618 Page Diesel Drag, 120', 5 yard
5-W Bucyrus Monighan Drag, 120', 5 yard
2400 Lima Dragline, 110', 6 yard
1055 P&H Dragline, 90', 4 yard
1201 Lima Dragline, 90', 3 yard
955 P&H Dragline, 90', 2½ yard
3500 Manitowoc 60 ton Crane
802 Lima Cranes
4161 Marion Comb. Elec. Drag & Shovel
100-B Comb. Electric Drag & Shovel
200-B Manitowoc Comb. Shovel & Crane
5480 Marion Electric 15 yard Shovel
1600 P&H Electric 6 yard Shovel
2400 Lima 6 yard Standard Shovel
4500 Manitowoc 4 yard H. L. Shovel
1201 Lima 2½ yd. H. L. Shovel
3500 Manitowoc 2 yd. H. L. Shovel
3000-B Manitowoc 2 yd. Shovel
955 P&H Standard Shovel
Unit 1020 ¾ yard Shovel—1 yr. old
600 Reich Heavy Truck Mounted Rotary Air Drills (Both Lever Arm and High Mast)
Mayhew Rotary Truck Mounted Air Drills
Portadrill Truck Mounted Air Drill
Euclid Trucks—Bottom & Rear Dump

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

STRIPPER

A deep mine coal operator with large holdings desires contact with experienced strip mining organization. Must have equipment suitable for production of large tonnage in hilly terrain.

BO-3621 Coal Age
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

2 TELEPHONES $22.75

Inter-communicating headsets, two wire system. Included Two 3 volt batteries, 50 ft. of wire and simple wiring instructions. Additional wire 1 cent per ft. or $25.00 per mile. Complete list of telephone parts, handsets, magneto—common battery — and dial telephones, switchboards, etc. All shipments FOB Simpson, Penna.

Telephone Engineering Co., Dept. 2-CA-7, Simpson, Pa.

RAVEN MINING EQUIPMENT COMPANY

GENUINE BARGAINS IN GOOD USED EQUIPMENT
FAIR DEALINGS ALWAYS!

Complete 4-Track Tipple with Cleaning Plant.
4 Rotary Converters, latest type.
10 Locomotives, 4 to 10 tons.
1—Goodman 212 Cutting Machine.
3—Jeffrey 35-B and 35BB Cutting Machines.
1—Jeffrey 35-L Cutting Machine.
2—Goodman 12AB and 12AA Cutting Machines.
3—Sullivan Machines 15" high.
All types of Chain Conveyors.
Goodman G-12½ Shaker Conveyors.
Coal Stacking Conveyors.
Low vein Air Compressors.
150 End Dump Mine Cars.
21 Drop Bottom Mine Cars.
Copper Trolley and Feeder Wire.
Brown Fayro Car Spotting Hoists.
Large Stock of Supplies of all Kinds and Hundreds of Items too Numerous to Mention.

Write • *Wire* • *Phone*

C. T. Adair—Day: Richlands 5505—Night: Richlands 5521

Mail—Raven (near Richlands) Virginia

Wanted

COAL MINE or COAL ACREAGE

Major coal mining concern presently producing several million tons of bituminous coal annually is interested in acquiring additional operating mines having minimum annual production capacity of 250,000 tons. Will purchase the capital stock or physical assets.

Will also consider management of producing mines, providing financial assistance to increase production.

Furthermore, interested in acquiring substantial coal acreage where there are favorable mining and marketing conditions.

All information will be kept strictly confidential. Please write details to

Box B-1, Suite 1400, 1475 Broadway
New York 36, N. Y.

Proven COST REDUCTION PROGRAMS
for the Coal Industry
HELMICK & ASSOCIATES
9619 LAKE SHORE BLVD. CLEVELAND, OHIO

WANTED TO BUY
AUGER
Preferably Compton
Model 2B or equivalent
W-3911 Coal Age
520 N. Michigan Ave., Chicago 11, Ill.

Replies (Box No): Address to office nearest you
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If there is anything you want that other readers can supply
OR . . . *something you don't want*— that other readers can use—
Advertise it in the
SEARCHLIGHT SECTION

POSITIONS VACANT

Engineer to fill vacancy in Engineering Dept. of large coal mining operation. Must be qualified for underground and surface surveying, mapping and general drafting work. Apply: Inland Steel Company, Wheelwright, Kentucky.

Wanted: Civil or Mining Engineer—Experience Coal Mining—to fill position of Assistant Chief Engineer. Age 30 to 45. College graduate. Location, Kanawha District. Modern house available in mining town. Paved roads and near Charleston, W. Va. Please state qualifications. P-5787, Coal Age.

A progressive 75 year old coal mining corporation seeks the services of a Mining Engineer under 40 years of age. A graduate with 5 years' experience or if non-graduate, one of equal ability is required. Good camp housing or nice residential town within 20 miles of operations. A demanding position with salary to match. Location, Eastern Kentucky. Address replies to Black Star Coal Corporation, P. O. 355, Louisville, Kentucky.

POSITION WANTED

Coal mine General Superintendent or Superintendent. 20 years' experience in all types and phases of coal mining. Thoroughly experienced in mobile, track and belt mining. References on request. Write to PW-4029, Coal Age.

BUSINESS OPPORTUNITY

Strip Land for Lease well drilled very high grade S. Ill. strip coal available to responsible small operator. ¼ million tons under 50 ft. Short truck haul to river and T.V.A. market. Reply giving equipment available to BO-3866, Coal Age.

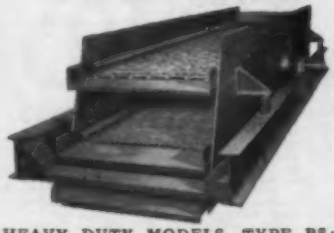
WANTED

Anything within reason that is wanted in the field served by Coal Age can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

BONDED EQUIPMENT BARGAINS

IMMEDIATE SHIPMENT FROM OUR FACTORY—WRITE, WIRE OR PHONE

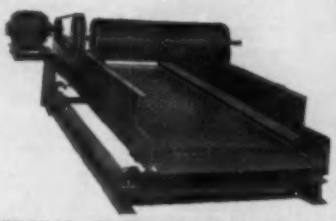
NEW BONDED® HEAVY DUTY VIBRATING SCREENS



HEAVY DUTY MODELS, TYPE BS: Four bearing positive throw eccentric shaft; 3′ x 6′ to 5′ x 14′; 1 to 5 decks. White for New 8-page Bulletin No. 1087.

Model Number	Screening Area	No. of Decks	Sale Price
124AS	2′ x 4′	1	$ 443
224AS	2′ x 4′	2	472
126AS	2′ x 6′	1	472
226AS	2′ x 6′	2	501
136AS	3′ x 6′	1	581
236AS	3′ x 6′	2	688
336AS	3′ x 6′	3	956
138AS	3′ x 8′	1	675
238AS	3′ x 8′	2	815
338AS	3′ x 8′	3	996
336BS	3′ x 6′	3	1303
436BS	3′ x 6′	4	1447
138BS	3′ x 8′	1	1231
238BS	3′ x 8′	2	1282
338BS	3′ x 8′	3	1375
248BS	4′ x 8′	2	1865
348BS	4′ x 8′	3	2035
2410BS	4′ x 10′	2	1953
3410BS	4′ x 10′	3	2305
2412BS	4′ x 12′	2	2319
3412BS	4′ x 12′	3	2635
4412BS	4′ x 12′	4	2833

NEW BONDED® GENERAL DUTY VIBRATING SCREENS



GENERAL DUTY SCREENS, TYPE AS: Eccentric weight mechanism, spring mounted, 1 to 3 decks, 2′ x 4′ to 3′ x 8′. Write for New 8-page Bulletin No. 1086.

For mineral, chemical and other industrial products. Fast, efficient and economical for cleaning, sizing, grading, dewatering. Made in all metals including stainless steel. Enclosed models for hot materials or dust control. Bonded screens are built for any screening operation, wet or dry.

NEW BONDED® TROUGHING IDLER CONVEYOR BARGAINS

Complete Ready-Fab sections quickly and easily joined together on the job. We take our loss on our stock of short length belting. You can save as much as 50% on the BONDED CONVEYOR SPECIALS listed, with conveyor belting in two pieces. Conveyors are equipped with 5″ roll diam. idlers and return rolls, 20″ diam. head pulley and 16″ diam. tail pulley mounted on 2¼ or 2-7/16″ diam. shaft. Belt is new 4-ply, 28-oz. duck, 1/8″ top rubber cover x 1/32″ bottom cover and is fresh stock made by leading manufacturers.

CONVEYOR PRICES INCLUDE BELTING

Belt Width	Length of Conveyor	List Price	Sale Price
14″	25′	$1397	$ 722
14″	50′	2222	1144
14″	85′	3377	1733
16″	20′	1262	636
16″	45′	2137	1088
16″	60′	2662	1359
16″	90′	3712	1900
18″	25′	1477	794
18″	45′	2217	1166
18″	70′	3142	1648
18″	85′	3697	1933
18″	100′	4252	2220
18″	130′	5362	2797
20″	25′	1517	828
20″	60′	2882	1533
20″	75′	3467	1838
20″	90′	4052	2145
24″	25′	1590	898
24″	45′	2430	1330
24″	70′	3480	1875
24″	100′	4740	2514
24″	120′	5580	2950
24″	130′	6840	3603
30″	50′	2911	1617
30″	70′	3871	2119
30″	90′	4831	2614
36″	25′	1818	1118
36″	45′	2858	1678
36″	60′	3638	2096
36″	100′	5718	3214

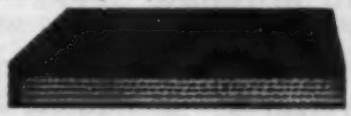
For conveyors longer or shorter than those listed above, add or deduct the following per foot prices according to belt width. Prices include belting. Write For Buelltin #1138.

For 14″ belt	$16.84 per foot
For 16″ belt	18.04 per foot
For 18″ belt	19.24 per foot
For 20″ belt	20.37 per foot
For 24″ belt	21.78 per foot
For 30″ belt	24.75 per foot
For 36″ belt	27.95 per foot

Bonded Troughing Idler Conveyors are also available with Truss Type Construction. Write for descriptive information and prices.

NEW CONVEYOR BELTING SAVE UP TO 25%

Heavy duty 4-ply, 28 oz. duck 3/8″ top rubber cover by 1/32″ bottom cover 12# to 15# average friction pull; 800# to 1000# average cover tensile rubber belting having high tensile strength, tough cotton duck, strong carcass and proper flexibility. For heavy boxes, bags and bulk materials. Troughs easily. Famous brands at deep cut prices. Fresh stock.



Width	Ply	List Price	Sale Price
14″	4	$3.52	$2.83
16″	4	3.96	2.97
18″	4	4.38	3.28
20″	4	4.83	3.80
24″	4	5.68	4.26
30″	4	6.97	5.21
36″	4	8.26	6.18

A high grade of heavy duty 4 and 5-ply, 28 oz. duck, 3/8″ top rubber cover x 1/32″ bottom rubber cover, 16# to 19# average friction pull, 2500# to 3000# average cover tensile belting. This belt is for more severe services, high tonnages and abrasion resistance. For handling stone, mineral ores, concrete, cement, coal and other similar materials, both wet and dry. Belt has molded rubber edge.

Width	Ply	List Price	Sale Price
16″	4	$4.71	$3.46
18″	4	5.23	3.83
20″	4	5.73	4.37
24″	4	6.74	4.94
30″	4	8.28	6.07
24″	5	7.90	5.78

The following belts are 5-ply, 32 oz. duck:

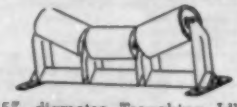
Width	Top Cover	Bottom Cover	List Price	Sale Price
24″	1/8″	1/16″	$8.56	$6.42
30″	1/8″	1/16″	10.52	7.89
36″	3/16″	1/16″	14.21	10.66

Other widths, plies, duck weights and cover thicknesses available at low prices. Write for Free Sample.

BONDED CONVEYOR ACCESSORIES

Carrying Belt Guide Idler $14.50 — Belt Guide Idler $11.75 — Wing Pulley $71.50

NEW IDLERS AND RETURN ROLLS 25% BELOW LIST PRICE

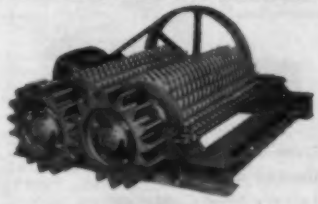


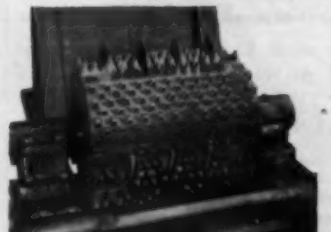
3-roll, 5″ diameter Troughing Idlers for:			
14″ belt	$18.50	24″ belt	$21.25
16″ belt	19.25	30″ belt	22.00
18″ belt	20.50	36″ belt	22.75
20″ belt	20.75	48″ belt	25.50

1-roll, 5″ diameter Return Idlers for:			
14″ belt	$7.25	24″ belt	$ 8.50
16″ belt	7.50	30″ belt	9.50
18″ belt	8.00	36″ belt	10.00
20″ belt	8.25	48″ belt	11.50

All steel. Interchangeable with other well-known makes. Furnished with easily replaceable pre-lubricated Sealed ball bearings. Also can be furnished with greasable type Alemite Fitted bearings at slight additional cost. Maintenance is negligible. Write for bulletin #1138.

NEW BONDED® COAL CRUSHERS





Double and Single Roll models with single & double drive. Capacities to 500 tons per hour. Will crush to all sizes from stoker to 8″. Take Feed sizes to 24″. Teeth designed to give accurate sizing, minimum of fines. Complete with steel hoppers. Write for Bull. #1119.

Priced from $527.00

BONDED SCALE AND MACHINE COMPANY

PHONE: HIckory 4-2186 Days; 2190 S. Third St.

WRITE FOR FREE CATALOG AND PRICES

Mfgrs. of Scales, Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers and Feeders

PHONE: AXminster 1-2213, Evenings Columbus 7, Ohio

MINING EQUIPMENT FOR SALE

TRACKLESS EQUIPMENT

(C) 2—14BU Joy Loaders
(C) 2—8SC Joy Shuttle Cars
(W) 2—32E10 Joy Shuttle Cars Rebuilt
(C) 1—32E7 Joy Shuttle Car
(C&W) 4—32D Joy Shuttle Cars
(C) 1—Lee Norse Shuttle Car
(W) 1—T2 Joy Cat Truck
(C&W) 6—12BU 9E Joy Loaders
(C) 1—8BU 500 V. D.C.
(C) 1—8BU 250 V. D.C.
(W) 1—8BU 250 V. D. C.
(W) 1—8BU 110, 220/440 V. AC
(W) 1—Baker Battery Supply Trailers, Permissible
(C) 1—29U Jeffrey, Rubber Mtd.
(C) 1—PLII-5E Joy Elevator
(C) 1—PLII-7E Joy Elevator
(C) 2—PLII-8E Joy Elevators
(W) 4—40 H.P. Asmo Self Propelled Air Compressor-Permissible

CONVEYORS

(W) 1—MTB 26" Joy Belt Conveyor 870'
(W) 1—36" Belt Conveyor 2600'—Almost New
(C) 1—MTB 30" Joy Belt Conveyor 1000 Centers
(W) 1—25 H.P. MTB Belt Drive
(W) 3—65A 24" Goodman Conveyors Approx. 500'
(C) 1—MTB 26" Joy Conveyor, 1000 Centers Less Belt
(C&W) 9—61AN Jeffrey Room Chain Conveyors
(W) 7—61HG Jeffrey Face Chain Conveyors
(W) 2—61 EW Jeffrey Elevating Chain Conv.
(C&W) 4—61W Jeffrey 13" Gathering Chain Conveyors
(W) 4—13" Joy Chain Conveyors, Permissible
(C) 3—20" Joy Chain Conveyors
(W) 6—G15 Goodman Shaker Conveyors
(C&W) 6—G12½ Goodman Shakers AC & DC
(W) 1—PT12 Long Piggyback Conveyors
(W) 32—Goodman Power Duckbills Model 427, G1½
(W) 1—26" x 140' Tipple Belt Conveyor
(W) 1—74" x 48' Tipple Belt Conveyor

CUTTING MACHINES

(W) 4—7B Sullivans
(C&W) 4—7AU Trask Mtd. Sullivans
(W) 6—11B Sullivans, Both 35 & 50 H.P.
(W) 1—29C Jeffrey Arc Wall
(C) 1—29U Jeffrey 220/440 V., 42" T.G. Excellent
(C) 1—35L Jeffrey
(C&W) 15—35B & 35BB Jeffreys, As Is or Rebuilt
(C&W) 6—12AB Standard Goodmans 35 H.P.
(W) 4—12AA Standard Goodmans, 50 H.P.
(W) 3—212AA Baby Goodmans
(W) 1—312 G3, 220/440 V. AC Goodman, Rebuilt
(C) 2—412GA Goodmans
(W) 4—512 DA Goodmans
(C) 2—712 Goodmans
(C) 1—824 Goodman, 42" T.G.
(C) 1—1224 Goodman, Rubber Mtd.
(C) 1—Lot Machine Trucks for Jeffrey & Goodman

LOCOMOTIVES

(W) 1—4 Ton Ironton, 42" T.G. Completely Rebuilt, 23" High
(C) 1—MH12 Jeffrey
(C) 1—MH96 Jeffrey
(W) 3—MH88 Jeffrey
(W) 1—MH150 Jeffrey, 42" T.G. 23" High
(C) 1—MH110 Jeffrey, 42" T. G.
(C&W) 4—MH100 Jeffreys, 36" T.G.
(W) 5—HM803 GE 36", 42" or 44" T.G.
(W) 5—HM823 GE 42" T.G.
(W) 1—8-30 Goodman, 4 Ton, 25" High, 36" T.G.
(C&W) 3—3314T, Goodmans, 8 Tons
(W) 1—8 Ton Goodman
(C&W) 2—904 West, 6 Ton Locomotive
(C&W) 1—6 Ton, GE, Battery Locomotive—With Batteries, All New

MINE CARS

(W) 200—42" T.G., 23" High, E.D.
(W) 18—42" T.G., E.D., 19" High
(W) 50—42" T.G., ACF Drop Bottom Cheap
(W) 13—36" T.G. Sanford Day, Drop Bottoms
(C) 14—42" T.G. End Dump, Wood
(W) 50—44" T.G. End Dump, 3 Ton, All Steel, Excellent
(W) 75—44" T.G. End Dump, 2½ Ton, Composite Cars Enterprise
(W) 65—44" T.G. End Dump, 2 Ton, Enterprise, Composite
(W) 100—44" T.G. End Dump, 1½ Ton 23" High, Composite

SUBSTATIONS

(C) 1—100 KW, GE Motor Generator Set
(W) 1—200 KW West, Rotary, 1200 RPM, 2300/4000 V.AC, 275 DC, Automatic Breakers
(C) 1—200 KW HOC8, GE Rotary, 2300/4000 V. 275 DC
(W) 1—150KW West, MG Set, 1200 RPM 2200 V., 275 DC
(C) 1—150KW West, MG Set, 200V
(W) 1—150KW Rotary 2300/4000 Completely Automatic
(W) 5000'—30" Goodyear Coal Flow & Raybestos Manhattan Homecord Belt
(W) 1—150 KW GE MG Set, 1200 RPM, 2200 V. 275 DC

MISCELLANEOUS

(C&W) 8—HKL Brown Fayro Car Spotting Hoist
(C) 1—Nolan Automatic Car Spotter
(C&W) 13—Hoist, 5 to 100 H.P.
(C) 1—HKM Brown Fayro Car Spotting Hoist
(C) 1—25 H.P. Double Drum Hoist
(C) 1—15 H.P. Car Spotting Hoist, 220/440 V.
(W) 2—Gets Mine Track Scales
(W) 2—Crossover Dumps—New and Used
(C&W) 16—Coal Drills, A7, 36A, 471 & 572, AC & DC
(W) 1—Armco Prefab Steel Building—130' Long
(W) 1—5' Morrow Shaker
(C) 1—42" Loading Boom, 32' Long
(C) 1—48" Loading Boom
(W) 1—Lot 18" Belt Conveyor For 30' to 150'
(W) 1—48" Morrow Scraper Conveyor 250' Long
(C) 1—D4 Caterpillar Dozer
(C) 1—42" x 36" Jeffrey Flextooth Crusher
(W) 1—MSA Bantam Duster
(C) 2—American Mine Door Rock Dusters
(C) 1—30 H.P. MSA Rock Duster Permissible
(C) 1—5' x 10' Double Deck Screen
(C) 1—210 Cu. Ft. Schramm Air Compressor
(C) 1—105' Cu. Ft. Acme Air Compressor—Track Mtd.
(C) 2—ITE Automatic Circuit Breakers
(C) 1—6' Aerodyne Fan
(C&W) 6—34J & 35J—Joy Motors for Locomotives or Shuttle Cars
(C&W) 5—Battery Chargers
(C&W) 10—Pumps, All Types
(W) 1—24 x 30 Jeffrey Double Roll Coal Crusher

See our other ad in this issue for the machinery and equipment we are selling from the Pruden Coal and Coke Mines at Pruden, Tennessee.
We are interested in purchasing any and all types of mining equipment and especially late type machinery.

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MINING AND INDUSTRIAL EQUIPMENT

Whitesburg, Kentucky, P. O. Box 610, Phone 2590 or 2594
*(W) Denotes equipment located at Whitesburg, Kentucky

Clarksburg, W. Va., P. O. Box 227, Phone 3-0253
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We carry a large stock of rebuilt and guaranteed transformers, and invite your inquiries.

Custom-built transformers and coils manufactured to your specifications.

Expert Repair Service—all makes and sizes of transformers rewound, repaired and redesigned. Ask for our price schedule.

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40 Years' Dependable Service

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20"g, 30"g, 42"g mine cars
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29LC, G shakers
24", 30" beltlines
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Crushers, single roll and jaw
Bins for truck loading
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UNIVERSAL Wire and Cable
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Jeffrey—65A—4S—Low Type Shuttle Car. All Hydraulic Elevating Discharge. In A1 Condition. Looks & runs like new. Bargain.

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Boonville, INDIANA

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Every Day of the Year — at J. T. FISH & COMPANY

We Own What We Advertise

Buy from the largest stock of good mining equipment in America. Includes all types of Joy Cutters, Shuttle Cars, Cat Trucks, Belt Conveyors, Chain Conveyors, etc.

JOY EQUIPMENT—rebuilt

1—Joy 20-BU Loader, latest type.
2—Joy 14-BU Loaders, low pedestal.
3—Joy 14-BU Loaders, medium pedestal.
1—Joy 14-BU Loaders, high pedestal.
3—Joy 12-BU Loaders, 9E, latest type.
3—Joy 11-BU Loaders.
6—Joy 8-BU Loaders, 250 volt DC.
3—Joy 8-BU Loaders, 220/440 AC.
2—Joy 8-BU Loaders, 34" overall height.
1—Goodman 660 Loader on cats. Excellent
1—Joy 8-BC Shuttle Car, rebuilt.
1—Joy 5BC Shuttle Car, rebuilt.
2—Joy 32E9 Shuttle Cars.
3—Joy 32E10 Shuttle Cars.
4—Joy 32E15 Shuttle Cars.
2—Joy 32E16 Shuttle Cars.
3—Joy T-2-5 Cat Trucks, rebuilt.
1—Joy T-2-6 Cat Truck with reel.
4—Joy 11-B Cutting Machines, like new.
1—Joy 7-B Cutting Machine, like new.
2—Goodman 512 Machines with Buggusters.
4—Goodman Machines on Cats, 31" high. All hydraulic.
1—Goodman 512 Cutting Machine, perfect.
3—LaNorse low vein Machine Carriers.

LOCOMOTIVES

2—Jeffrey, 20 ton, type MH-118, 42", and 44" Ga.
2—Jeffrey MH-2184, 15 tons.
4—Jeffrey, 13 ton, type MH-110, 36", 42" and 44 Ga.
3—Jeffrey, 10 ton, type MH-78, 42" and 48" Ga.
12—Jeffrey, 8 ton, type MH-98, 42", 44" and 48" Ga.
2—Jeffrey, 6 ton, type 2186, 22" above rail, perfect.
3—Jeffrey, 4 ton, type MH-96, 42", 44" and 48" Ga.
1—G. E. 4 ton, type 825 Locomotive, 28" high.
2—G.E. 825 Locomotives 22" high—4 ton.
10—G. E. 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
1—G. E. 8 ton, type 822 Locomotive, 44" Ga.
3—G. E. 10 ton, type 800 Locomotives, 42", 44" and 48" Ga.
1—G. E. 10 ton, 829 Locomotive, 36" Ga.
1—Goodman 4 ton, 8-30 Locomotive, 22" above rail.
1—Goodman 6 ton, Locomotive, 28" high.
2—Goodman type 35, 6 ton, 44" and 48" Ga.
2—Goodman 8 ton, type 32A, 36", 44" and 48" Ga.
3—Westinghouse, type 902, 4 ton, 42" and 48" Ga.
2—Westinghouse, type 904, 6 ton, 44" and 48" Ga.
2—Westinghouse, type 905, 44" and 48" Ga.
2—Westinghouse, type 907, 10 ton, 44" and 48" Ga.

TIPPLE EQUIPMENT

1—Cedar Rapids portable super Screening Plant.
1—Allis-Chalmers 5' x 14' Ripple Vibrator.
1—4' x 10' Robbins Gyrex Vibrator.
1—5' x 14' Vibrator, three deck, low head.
1—McNally Pittsburg all steel tipple, 3 track, perfect.
1—Complete 4 track tipple with washer and dryer.
Feeders, Drag Conveyors and Loading Booms.

CUTTING MACHINES

1—Jeffrey 29-UC Universal on cats.
1—Goodman on Cats, 31" Overall Height.
3—Goodman 512-G-3, 220 AC, rebuilt.
2—Goodman 312, 18" high.
1—Baby Goodman 212, rebuilt.
2—Goodman 512's with Buggusters, like new.
15—Goodman 12AA's and 112AA's.
10—Goodman 324 Slabbers.
2—Goodman 724 Slabbers.
15—Jeffrey 35L's, like new, 17" high.
3—Jeffrey 35L's on low vein trucks.
15—Jeffrey 35B's and 35BB's.
2—Jeffrey 28D's on track.
2—Jeffrey 29C's, truck mounted.
1—Jeffrey 29L on track, perfect.
2—Sullivan CR-10's, 15" high.

LOADING MACHINES

17—Joy Loaders, all types.
3—Jeffrey 61 CLR's on rubber, 28".
3—Jeffrey L-500 Loaders.
2—Myers Whaley No. 3 Automat Loaders.
3—Orkson Loaders, 26" above rail.

CONVEYORS

2—Joy 30" Belt Conveyors, 10 to 15 H.P.
1000' 30" Conveyor Belt
8—Jeffrey 61AM Room Conveyors, 300 ft.
10—Jeffrey 61 HG Face Conveyors.
2—61EW Elevating Conveyors.
2—61WH 15" Room Conveyors, 300 ft.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.

CONVERTERS AND DIESEL PLANTS

1—50KW, G. E. TC-6, 275 volt Rotary Converter.
3—100KW, G. E. TCC-6's, 275 volt Rotary Converters.
1—150KW, G. E. HCC-6's, 275 volt Rotary Converters.
1—250KW, G. E. HCC-6 Rotary Converter, 275 volt DC.
3—300KW, G. E. HCC-6 Rotary Converters, 275 DC.
1—200KW Westinghouse Rotary Converter, 275 DC. (All the above with 6900/13000 and-or 2300/4000 primary transformers)
1—65KW MG Set, General Electric, 275 volt.
2—150KW MG Set, General Electric and Westinghouse.
1—200KW MG Set, Ridgeway, rebuilt.
1—300KW Westinghouse MG Set, 600 Volts.
2—300KW G. E. MG Sets 275 volts.
1—500 KW Westinghouse MG Set, 275 volt.
1—Cummins 125KW Diesel with 250 volt DC Generator.
1—700 H. P. Shaft Hoist, complete.
Complete steam plant, will sell all or any part.
Boilers, like new, 1100 H. P. and 500 H. P. Also transformers, turbines, etc.
Complete Tipples with Cleaning Plants.

MISCELLANEOUS

10—Air Compressors, 1 H. P. to 40 H. P.
40—Mine Pumps, all types.
2—Barber Green self propelled Bucket Elevators.
Pipe, Plastic, Steel, Transit, all sizes 1" to 8".
15—Mine Cars, drop bottom, 42".
50—Mine Cars, 48" Ga. Drop Bottom, 49" above rail.
150 Mine Cars, 18" high, end dump, 44" Ga.
300 Mine Cars, end dump, 29" high, 48" Ga.
15—Brown Fayro HKL and HGD Car Spotters.
1—12 ton Differential Slate Larry.
5—Low Vein Water Cars.
Incline Hoists, 25 to 50 H. P.
Machine Tools for mine shops.
4—Storage Tanks, 10,000 Gallon.
1—Storage Tank, 6,000 Gallon.
Five Gallon G. I. Cans.
400 tons Rail, 25# to 60#.
10 tons Copper Trolley and Feeder
300 Transformers from 1 to 2,000 KVA, 110 to 13,000 primary volts.
400 Electric Motors, 3 to 200 H. P.
Huge stock of mine supplies
Suspension Bridge, 300 ft., long for river crossings.
1—International TD-24 Angledozer.

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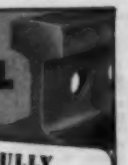

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4—FC Macks
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4500 Manitowoc Dragline, 4 yd., 140' boom, Cat. diesel engine.

80-D Northwest 2½ yd. Standard Shovel, Murphy diesel engine. Excellent.

54-B Bucyrus Erie Dragline, 2½ yd., 85' boom, Buda diesel. Rebuilt.

54-B Bucyrus Erie 2½ yd. Standard Shovel, Buda diesel. New 1954.

3500 Manitowoc Dragline, 2½ yd., 80' boom, D-17000 Cat. engine. Excellent.

903 Osgood Dragline, 2 yd., 70' boom, Cat. engine. Rebuilt $12,500.

1201 Lima Dragline, 3 yd., 85' boom, Cummins diesel, 100 hours.

46TD Euclid rear dumps, 22 ton, new 1953 7 1954.

TD14A Int. diesel 2 yd. front end loader. New 1954. Bargain.

42T Bucyrus Erie diesel 9" Well drill.

58BH Joy Champion diesel 7⅞" Rotary drill.

Plus many machines too numerous to mention.

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1—24" x 24" Jeffrey Single Roll
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1—11 HP Vulcan, single drum
1—20 HP Vulcan, single drum
1—22 HP Vulcan, double drum
1—25 HP Vulcan, single drum
1—30 HP Vulcan, single drum
1—37 HP single drum
5—50 HP single drum
2—60 HP single drum
1—75 HP Vulcan Double Drum
3—100 HP Box single drum
1—112 HP Vulcan, single drum
1—150 HP Vulcan, single drum
2—125-200 HP Ottumwa single drum
1—250 HP Ottumwa single drum
1—400 HP Stearns-Roger, single drum

BATTERY LOCOMOTIVES
3—3½-4 ton Mancha, 24" ga.
1—4 ton Westinghouse, 24" ga.
1—4 ton Ironton, 36" ga.
2—6 ton General Electric, 36" ga.
2—7 ton General Electric, 36" ga.
1—7 ton Atlas—36" ga.
3—8 ton Ironton, 36" ga.
2—8 ton General Electric, 36" ga.
2—8 ton Goodman, 36" ga.
4—10 ton Atlas, 36" ga.

TROLLEY LOCOMOTIVES
2—10 T. Jeffrey, 42" ga.
1—15 T. Goodman, 42" ga.
1—13 T. Jeffrey, 42" ga.
1—15 T. Jeffrey, 42" ga.

SHUTTLE CARS
1—Joy model 6OD3P, battery operated
7—Joy model 6OD1, battery operated

MINE FANS
1—120" Joy La-Del axial flow fan, model L-14
1—8H Jeffrey 42" aerodyne fan
1—7' Jeffrey aerodyne 2 stage fan

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MORSE BROS. MACHINERY COMPANY

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We are now offering for sale all of the equipment from all the mines of Pruden Coal & Coke Company, Pruden, Tennessee. This machinery is in excellent condition and immediate delivery is being made on all sales. The following is only a partial listing of the innumerable items of machinery, equipment and mining supplies owned by the company and offered at bargain prices.

TRACKLESS EQUIPMENT
1—14BU 7BAE Joy Loader
1—14BU 3PE Joy Loader
1—30BU Joy Loader
3—T2-5 Joy Cat Trucks
4—32E7 Joy shuttle cars
1—48C Joy shuttle car
1—CP Roof bolting machine
1—PL11 Elevator

CONVEYORS
1—36" Barber Green Belt conveyor, 2000' centers, this entire unit is almost new
3—MTB 26" Joy Belt Conveyors, 800' centers, each
9—UN17 Ladd shaker conveyors, complete
1—615 Goodman shaker conveyors
1—61HG Flexo conveyor
1—30" x 30' apron conveyor

CUTTING MACHINES
6—11B Sullivan Cutting machines
1—35BB Jeffrey on trucks
3—12AA Standard Goodman—on trucks
2—12AA Universal Goodman machines on trucks

SUBSTATIONS AND TRANSFORMERS
3—HCC6 200KW GE Rotary Converters, 2300/4000 V. semi-automatic
1—150KW GE Rotary, 2300/4000 V. semi-automatic boards
1—400 KVA auto transformer
1—300 KVA auto transformer
23—Transformers of various sizes from 5KVA to 25 KVA

LOCOMOTIVES & MINE CARS
1—MH2328 10 ton Jeffrey locomotive, hydraulic brakes, hydraulic sanding and completely modern rebuilt 44" t.g.
2—MH78 10 ton Jeffrey locomotives, 44" t.g.
10—MH88 6 ton Jeffrey locomotives 44" t.g.
1—3 ton Goodman Locomotive, 44" t.g.
170—31" high, Sanford Day Drop bottom mine cars, 44" t.g.
40—29" high S.D. drop bottom mine cars, 44" t.g.
35—36" high, S.D. Drop bottom mine cars, 44" t.g.
50—34" high S.D. drop bottom mine cars, 44" t.g.
3—6 ton monitors, 44" t.g.

MISCELLANEOUS
1—600 ton, all steel bin, bolted & may be dismantled & moved with little difficulty
1—Lot 40 & 80 lb. heavy duty 44" t.g. steel ties
1—Lot 40 & 80 lb. ASCE relaying rail, excellent condition, with switches, splice bars, & other track accessories
1—Lot 4/0 & 6/0 trolley line & trolley materials
3—W70 Joy Sullivan air compressors
3—Cantrell Air compressors, 44" t.g.
1—Ingersoll Rand compressor
4—Shop compressors
1—Black smith shop, complete
11—Hoists from 5 h.p. to 300 h.p. offered at bargain prices
3—Howe track scales
14—Pumps of various sizes
9—Mine fans 4' to 8'
1—D6 cat dozer
1—D7 cat dozer
3—1½ ton trucks
11—572 CP Coal Drills
3—571 CP Coal Drills
1—Stoper & impact wrench
1—Carpenter shop, 2 saws, planer, jointer, etc.
1—Bantam rock duster
3—Welders
2200'—1⅛" wire rope for incline, new
1100'—1⅜" lock coil cable
1—Steam jenny
1—Phillips carry all
1—Concrete Mixer

Transmission lines and materials, copper and aluminum wire, motors, switches, parts, pipe and plumbing supplies, shovels, picks, crowbars, hammers, safety lamps, complete engineering office (2-transits, 1 level and other items), office machines, store equipment, restaurant equipment, theatre equipment, overhead cranes, shop machinery and many many other items.

All of the underground equipment is 250 volt DC and the maintenance has been excellent as this machinery is ready for immediate use. If interested, write, wire or call our office at Whitesburg, Kentucky or Clarksburg, W. Va., and we will submit immediate quotations.

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NOW DISMANTLING REPUBLIC COAL COMPANY MINE, ROUNDUP, MONTANA.

100 tons Copper—4/0 & 6/0 Trolley 500,000 to 2,000,000 CM Feeder.
500 tons Rails, 30# to 60#.
12—Goodman 512 Cutting Machines.
2—General Electric 300KW MG Sets.
3—Allis Chalmers 150KW MG Sets.
1—200KW Rotary Converter.
1—150KW Rotary Converter.
2—Jeffrey 15 ton Locomotives, armor plate frame.
5—Jeffrey 10 ton Locomotives, armor plate frame.
150 ton Railroad Scale.
13—Goodman Locomotives, 6 ton.
450 All Steel Mine Cars.
All Steel Three Track Tipple Complete.
600 H. P. Shaft Hoist.
6 Ft. Jeffrey Aerodyne Fan.
Goodman 97-C Belt 30" like new.
2 Pumps, 250 H.P. Many smaller pumps.
12,000 Ft. Pipe 3" to 10".
11—Joy 7-BU Loaders.
$60,000 Supply House Inventory.
Equipment for complete repair and rebuilding shop.

Will sell all or any part of the above at a fraction of its worth.

NATIONWIDE MINING MACHINERY COMPANY
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FOR SALE

Page Dragline, Model 618-220, new 1950, 140' Boom, 2, 1 yd. Dragline Buckets, Diesel Engine, 320 H.P. Electric Swings, excellent condition, located: Tennessee.
Complete 100 K.W. Diesel Power Plant, located: Tennessee.
P & H Dragline, Model 1055 L.C., serial #11370, Diesel Motor, Model 375, Serial 168170, Electric Swings, 80' Dragline Boom, 3½ Drag Bucket, Lite Plant, A-1 condition, location: New York state.
Osgood Crane Model 805, Caterpillar 13,000 Diesel Engine, motor has 1100 hours, like new (Government surplus), can furnish hoe attachment.
Four—D8, Bulldozer 8R series, good running condition.
Two—D7, Dozer 7T series.
Two—D-D8, Cable, Dozer, 9U series.
Two—D4 Cable Dozer, less than 1000 hours.
One—Caterpillar 12 Grader, 9K series.
Two, Gallon Diesel Tandrom Graders, rebuilt.
Koering, ¾ yd. Crane, like new.
Four, Mississippi Bottom Dump Wagons, new, never used, will sacrifice, all above located: Cleveland, Ohio.

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NEW and REBUILT STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Tons 18" to 86½" Track Gauge.
GREENSBURG MACHINE CO.
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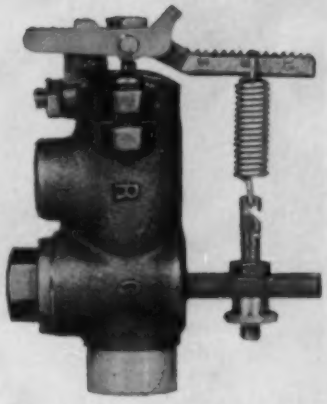

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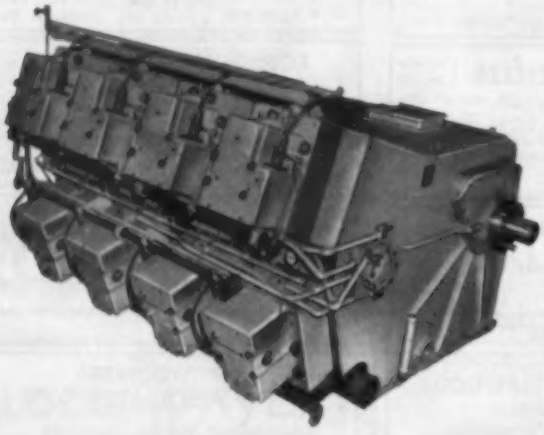

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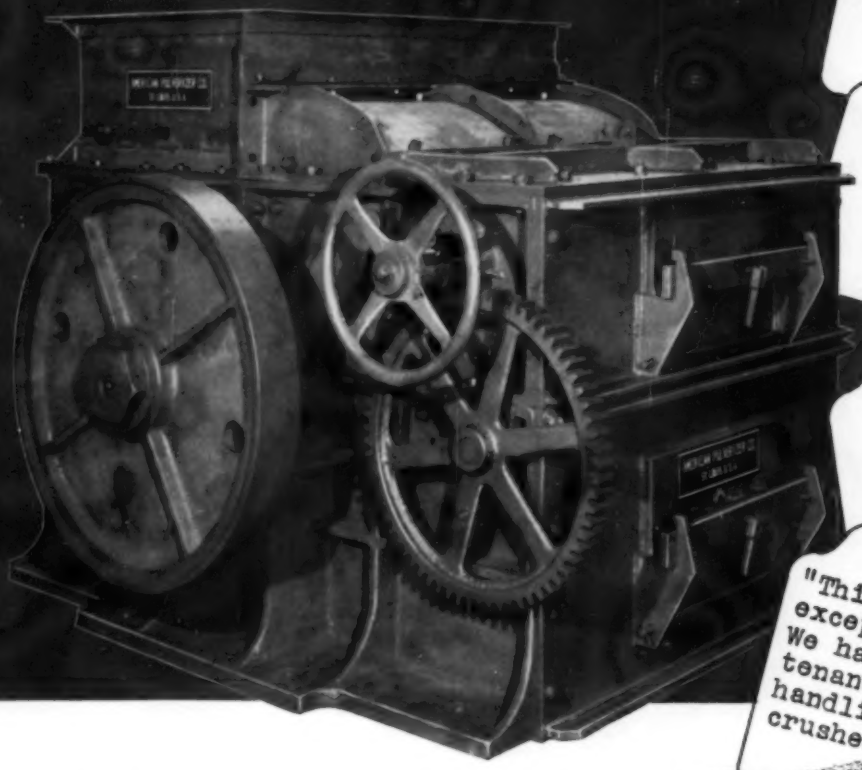

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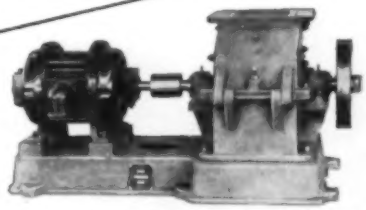

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